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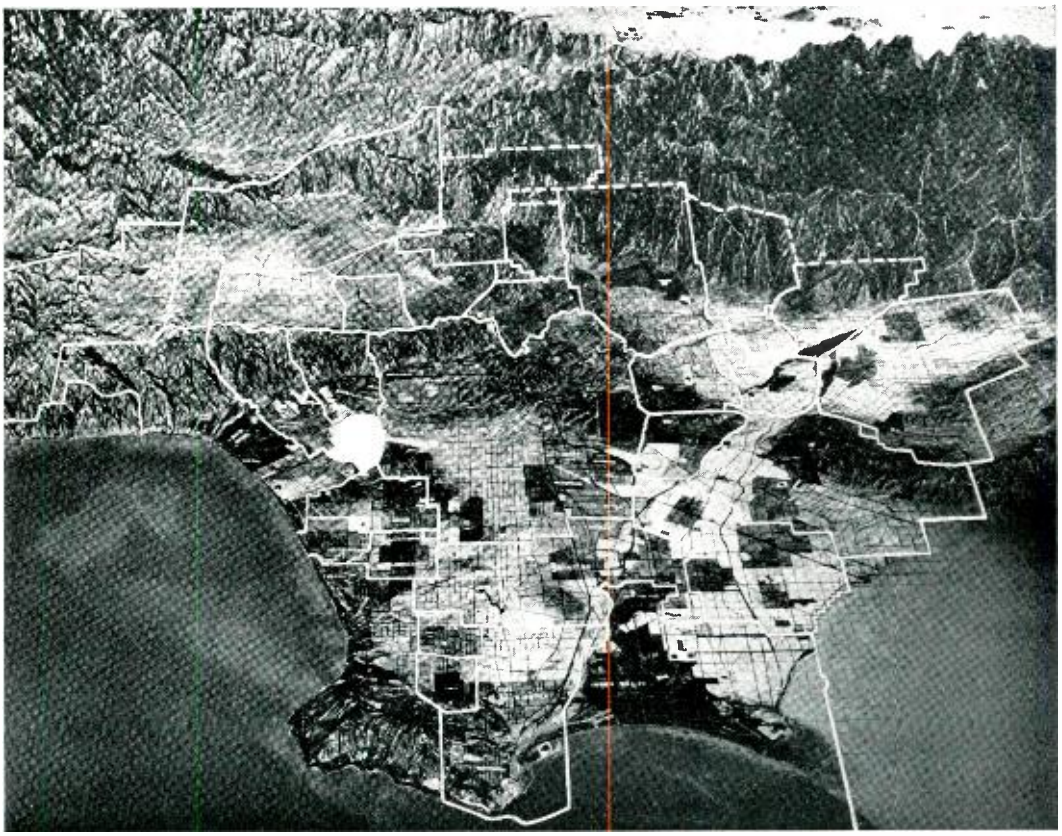


Automatic Ticketing

By O. A. FRIEND
Local Central Office Facilities

ON JANUARY 16, the first installation of a new automatic ticketing system was put in service to serve some 8,000 subscribers in Culver City, which is part of the extensive Los Angeles metropolitan area of nearly a million telephones. Formerly the Culver City subscribers could reach about twenty per cent of these telephones—those in the adjacent exchanges—by direct dialing; calls for the remainder had to be placed with the operator. The new equipment makes it possible for them to reach nearly all the telephones in the area by direct dialing, thereby extending the speed and convenience of dial operation to the great majority of their calls. The distinctive feature of the new equipment is that for each call it automatically prints a ticket showing the numbers of the calling and called subscribers and other information required for charging for the call.

Culver City, at the western border of Los Angeles, is shown in white on the relief map at the head of this article. As in the

other dial communities of the Los Angeles area, its switching equipment is of the step-by-step type. The old and the new central-office arrangements are shown by the upper and lower diagrams of Figure 1. With both methods, the calls are routed through step-by-step switches, divided into "originating switches" and "terminating switches." The former utilize one or more of the first three digits of the called number dialed by a Culver City subscriber to route the call to an interoffice trunk, the remaining digits serving to complete the call in the distant office. The terminating switches route incoming calls to the proper Culver City subscriber.

The trunks appearing before the originating switches were formerly restricted to those reaching nearby offices within the "local charge area." On calls to offices beyond this area, for which there is a toll charge or a charge of more than one message unit, the subscriber dialed "0" and then passed the call to the switchboard operator, who plugged into a direct or tandem trunk to reach the distant office. With the new method these trunks, instead of appearing in the switchboard, appear with the local trunks before the originating switches, permitting direct dialing of these calls. This is made possible by the interposed "ticketing equipment."

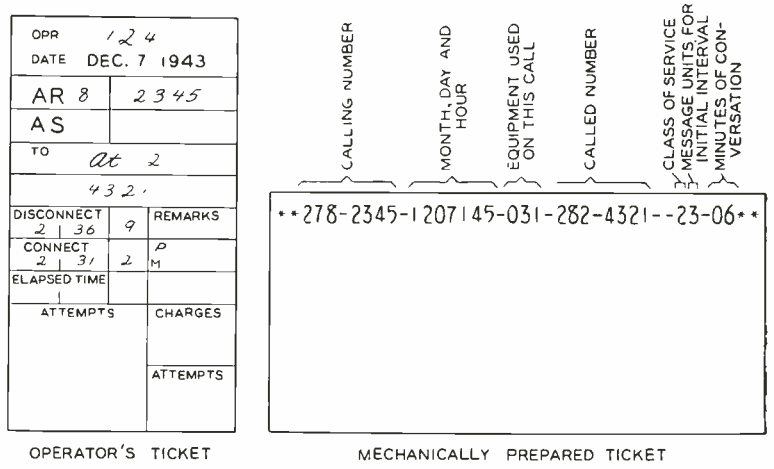


Fig. 2—One form of manual ticket at left, and the new mechanically prepared ticket at the right which gives all the necessary information as a series of numbers in a single line

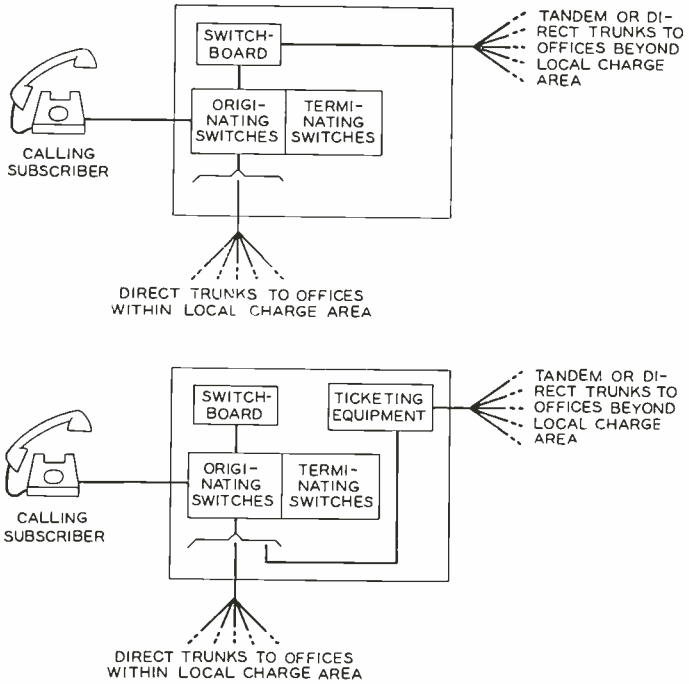


Fig. 1—Automatic ticketing changes the routing of a subscriber's call through the central office from that shown in the upper sketch to that in the lower

With the former method of operation, the operator would make out a ticket for each of the calls she handled. On one form of ticket, shown at the left of Figure 2, appear: the operator's number, the date, the numbers of the calling and called subscribers, and the times of beginning and end of the connection in hours, minutes, and tenths of minutes. When these tickets reach the accounting department, the elapsed time may be obtained by subtracting the CONNECT

time from the DISCONNECT time, and the proper charges are written in. The automatic ticketer, on the other hand, presents all necessary information as a series of numbers in a single line as shown at the right of Figure 2. What these various numbers represent is indicated above the ticket. Seven digit spaces are available for the month, day, and hour: two for the month, two for the day, and three for the hour, which is given in hours and tenths of hours. The particular call shown was made on December 7 at 14.5 hours, which, since the time is reckoned from midnight, represents 2:30 P.M. to the nearest six minutes. The two digits following the called number, although printed together, represent different things. The first digit indicates the calling subscriber's class of service, and the second, the number of message units chargeable for the initial interval, which may be three or five minutes. The information conveyed by this second digit is used for determining the proper charge to make for the total elapsed time, which is shown in whole minutes by the last two digits.

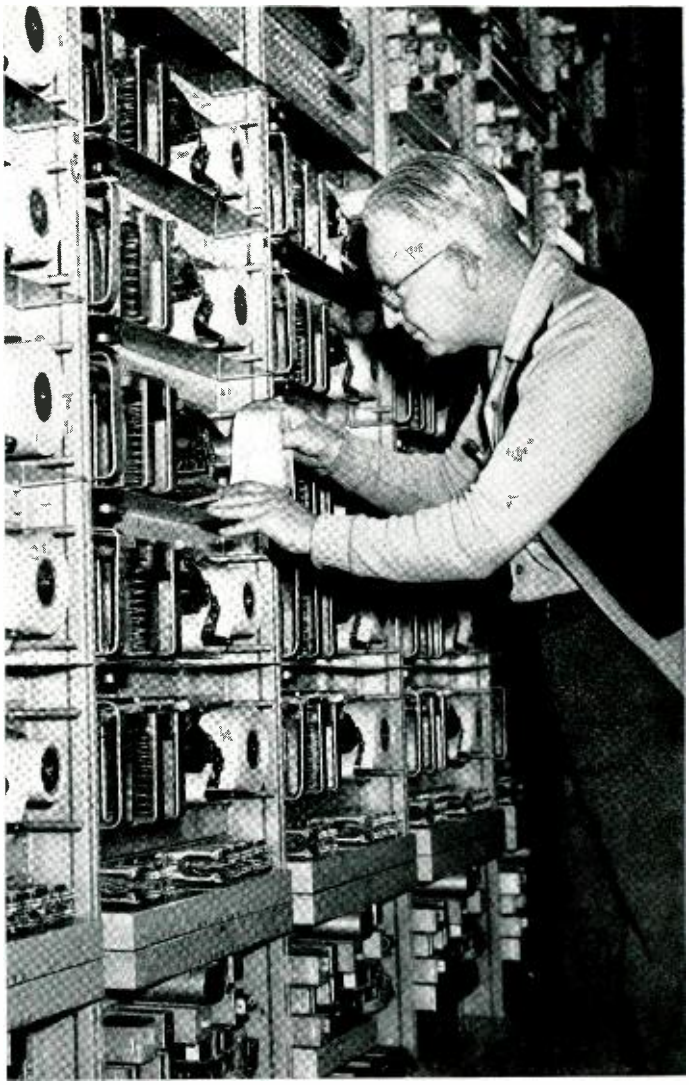


Fig. 3—Inserting roll of paper in the automatic ticketer

Some of the apparatus required to secure the information printed is associated with the call until disconnect occurs, but other apparatus is required only for short intervals of various lengths. As in crossbar offices, certain units of common equipment are provided which may be used with any of the trunks, and are connected to the ticketing circuit proper only for brief intervals as needed. These various units and their lines of association are indicated in Figure 4.

One of the ticketing circuits is permanently associated with each trunk used for this class of service, and is reached by the calling subscriber by dialing the office code for the desired subscriber—AT-2 for the call shown in Figure 2, or 282 using the digits corresponding to the initial letters AT. Since most of the calls using this type of service pass through a tandem office, these same three digits, 282, will have to be transmitted to the tandem office to control the selection of a proper outgoing trunk there. Since the dialing of 282 by the subscriber merely called in the automatic ticketing circuit, provision must be made for determining and retransmitting them over the trunk to the tandem office.

Senders control the progress of the call, and in addition to recording and transmitting the desired number, they also control the

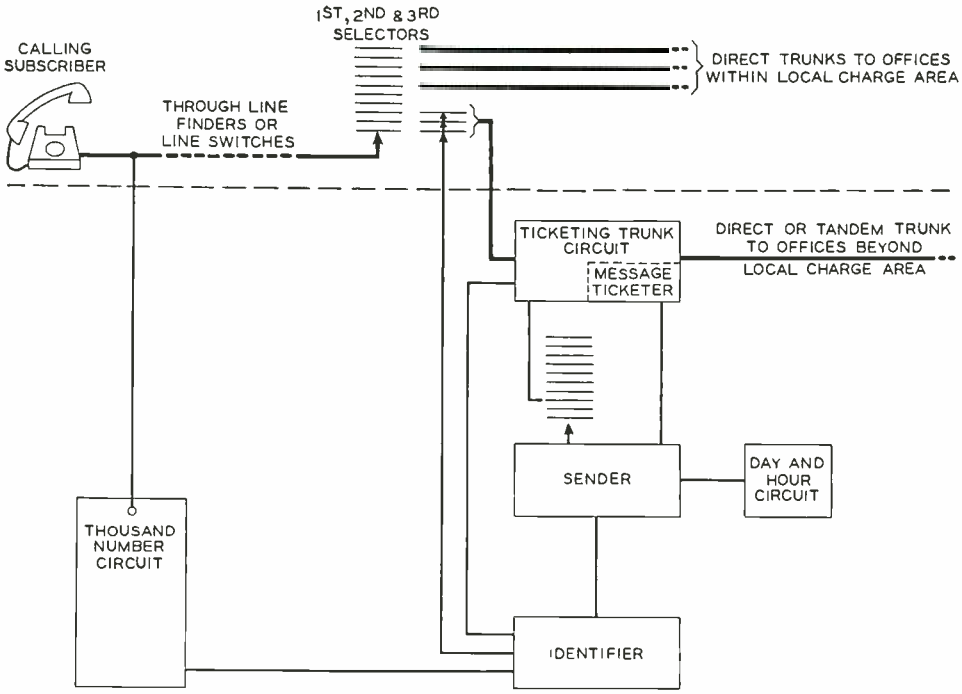


Fig. 4—Block schematic of the automatic ticketing system

printing of most of the information on the ticket. As soon as the ticketing circuit is seized, a sender is connected to it, and begins recording the digits dialed by the subscriber. Since at least part of the office code has already been dialed by this time, and since the sender must also know the number of the calling line to properly control the printing of the ticket, it, in turn, associates itself with an IDENTIFIER to get the information. The IDENTIFIER determines the office code by finding the level reached by the selector preceding the ticketing trunk. It determines the calling subscriber's number by connecting to the THOUSAND NUMBER circuits, of which there is one for each thousand numbers in the local office. With this information available, the sender connects to the message ticketer, and at once starts printing the ticket. At the proper time, it calls in a DAY AND HOUR circuit to secure the month, day, and hour. The IDENTIFIER has also given the sender the class of service and the message units for the initial interval, and thus the sender now has all needed information for printing the ticket except the elapsed time.

As soon as the sender gets the called-office code from the IDENTIFIER it begins transmitting it over the trunk, and then sends the subscriber's number, which it has recorded in the meantime. The IDENTIFIER and DAY AND HOUR circuits are released as soon as the necessary information is obtained from them, and as soon as the full number of the called subscriber has been transmitted and the ticket printed, the sender disconnects itself. Apparatus forming part of the ticketing circuit starts to time the call as soon as the called subscriber answers, and at disconnect, it automatically prints the chargeable time.

The finished ticket is of the same size as those used at toll boards, but the paper for it is supplied to the ticketing machine in a roll. From this roll the paper is passed through drive rollers, thence between the lower rim of the type wheel and a printing hammer, and then through guides to the cutting knife and the hopper. The general relationship of the major units of the ticketer is shown in Figure 5, and front and rear views of the ticketer itself, in Figure 6. A type wheel, carrying twelve characters—the ten digits from zero to nine, a dash, and an asterisk—is mounted on one end of a shaft which also carries an index wheel, a friction clutch

through which a small motor drives it, and a pair of interconnected brushes—one riding on a contact ring, and the other over a set of twelve stationary segments. Each commutator segment corresponds to one character on the type wheel, and when the brush is on any particular segment, the character corresponding to that segment on the type wheel is in position for printing. Voltage applied to a segment by the control circuit energizes the print magnet which lifts the print hammer to force the paper against the character. With the same motion a metal finger called the STABBER is pressed between two teeth on the index wheel to hold the type wheel stationary while the impression of the character is being made. As the magnet releases, a finger connected to the armature rotates a ratchet on the drive roll to step the paper ahead.

The slipping clutch permits continuous running of the motor in spite of the intermittent rotation of the type wheel. Contacts operated by the armature of the print magnet indicate when the magnet is fully operated, so that the voltage can be removed

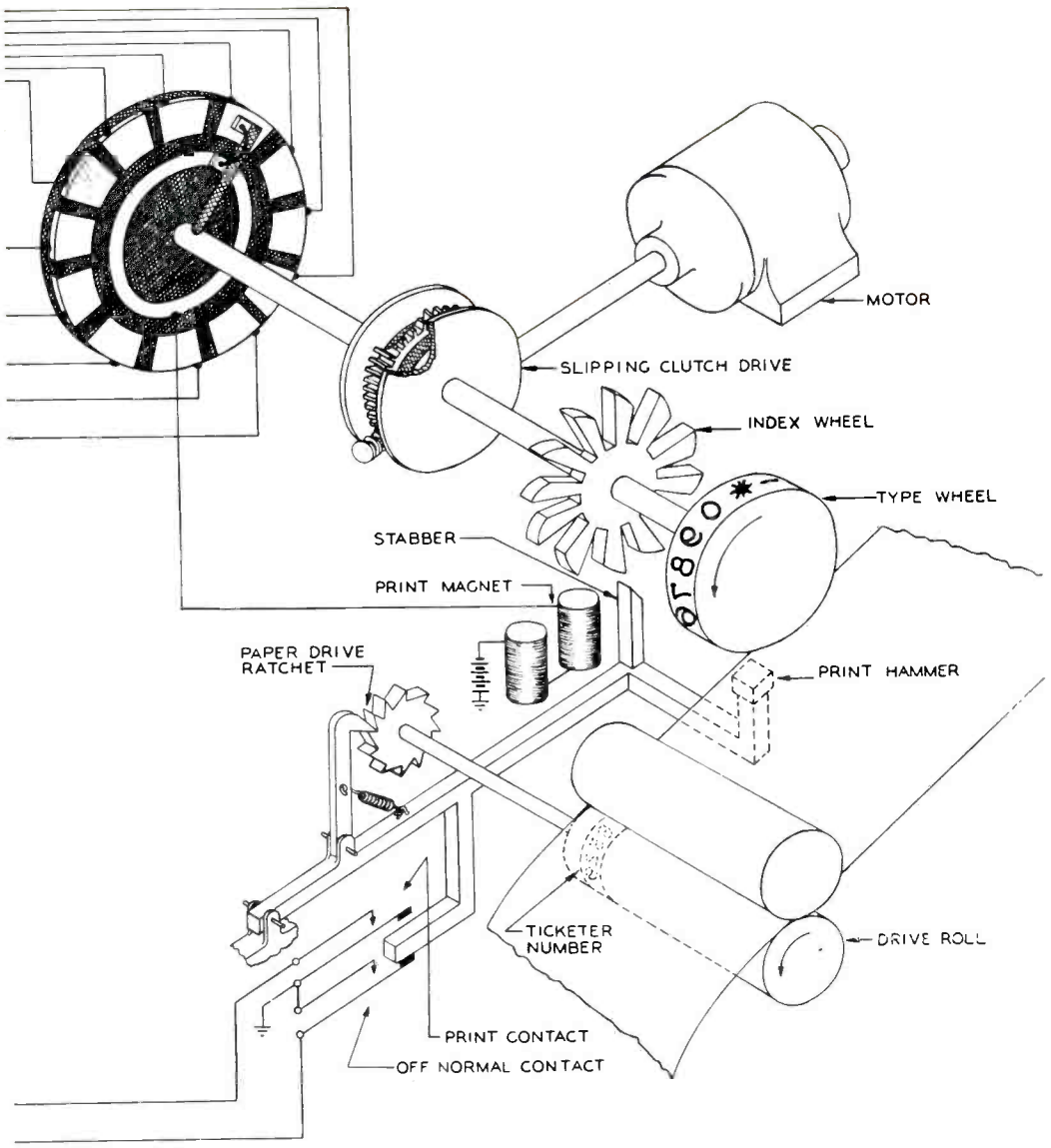


Fig. 5—Schematic diagram of ticketing mechanism

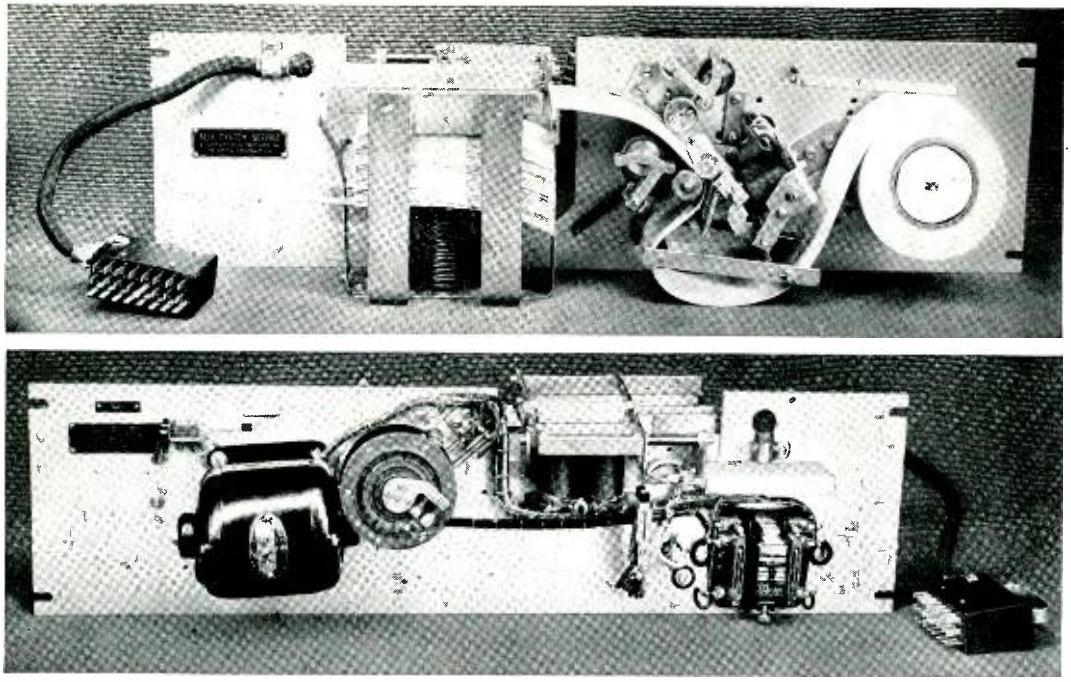


Fig. 6—The ticketing unit: front view, above; rear view, below

and also when the magnet is fully released, so that the printing of the next character can be started. The type wheel rotates at about 375 rpm and printing is at the rate of about seven characters per second.

Automatic ticketing was selected for the Los Angeles network in preference to another direct-dialing method known as zone registration, which has been used to some extent in other dial systems. Under the latter plan the subscriber message register is operated more than once on answer of the called subscriber in accordance with the rate to the called office, and is operated further for each overtime interval. Several factors favor ticketing for the Los Angeles area. The percentage of subscribers having message-rate service is relatively low, particularly in the suburbs, and the registers which it would be necessary to buy for flat rate subscribers would be used only on the zone calls. Certain circuit difficulties would have to be overcome to make it possible to operate the registers in the existing step-by-step offices more than once on the same call. Finally, the individual record provided for each call is of value in answering inquiries regarding bills, and this advantage increases in importance as the range of dialing is extended to the more expensive calls. Further details of this new system will be described in forthcoming issues of the RECORD.

THE AUTHOR: O. A. FRIEND, after graduating from the University of Michigan in 1910 with the degree of B.E.E., joined the A T & T and was assigned to development of power equipment. Entering the Army early in World War I, he served in the Research and Inspection Division of the Signal Corps in France. He returned to the D & R at the time the machine switching program of the Bell System was getting under way, and became associated with the development of the step-by-step type of dial equipment. When the D & R combined with the Laboratories in 1934, he became Step-by-Step Engineer in what is now the Switching Engineering Department, and has been engaged in further development of the step-by-step system.

Historic Firsts: The Radio Link

ON July 16, 1920, an earthquake shook Los Angeles, and rumors spread that the "Magic Isle" of Catalina had sunk into the sea. Earlier on this same day, Catalina had been linked to the mainland by telephone, and thus to dispel this rumor, it was necessary only to pick up a telephone in Los Angeles and call the town of Avalon on the island. This new telephone link was no ordinary service extension. The thirty-mile stretch of ocean between Avalon and Long Beach was bridged by radio; for the first time a radio link was made an integral part of a telephone system. Although the Arlington-Paris experiment had demonstrated the possibility of long distance radio telephony nearly five years earlier, this was the first time reliance had been placed on radio to give regular day-in day-out public telephone service.

When the need arose for telephone service to Catalina, cable communication could not have been provided without considerable delay, and radio was turned to as an alternative. This was shortly after World War I, and the development of a line of standard radio equipment had been undertaken by the Engineering Department of the Western Electric Company as a post-war project. Although not ready for manufacture, designs were sufficiently advanced to permit making the equipment in the laboratory.

In establishing this link, telephone and radio technicians joined hands to do a job that had never been done before—the bridging by radio of a gap between sections of wire telephone plant to provide public telephone service. The circuit established, between the Los Angeles toll board and the Avalon switchboard, was made up of twenty-five miles of wire circuit on the mainland, thirty-two miles of radio link, and one mile of wire line on the island. It was handled just as any wire toll circuit, and could be switched at the Los Angeles end to connect with circuits to all parts of the country.

The radio stations were at Long Beach, on the Pacific shore south of Los Angeles, and at Pebbly Beach, just south of Avalon near the southern end of Catalina. The transmitters had a carrier output of about 100 watts, and two-way communication was obtained by using two frequencies — 638 kc from California to Catalina, and 750 kc in the opposite direction. These channels are in what is now the most desirable region of the broadcast band, but at that time broadcasting was still in the future.

The Catalina radio circuit was popular from the first, and carried such a large amount of traffic that two operators were necessary at each end to handle it. So popular was it, as a matter of fact, that within a year or two, additional facilities were urgently required. Since the trend of traffic indicated that many more channels would shortly be needed, submarine cables were decided upon, and the radio circuit was removed about three years after its opening. It had conclusively demonstrated that radio telephone links were eminently practicable, and it indicated the most promising directions for further developments to take. It was the forerunner of the present radio telephone services of the Bell System, which prior to the war reached some seventy countries.

Hand Lapper for Quartz Crystals

By G. M. THURSTON
Radio Development

GRINDING quartz crystals to their final thickness is an extremely delicate operation because the desired dimensions must be reached to within a very few millionths of an inch. The crystal is brought to approximately the required thickness in a lapping machine of the general type already described in the RECORD.* The final finishing laps are made by hand, however, since the process is short, and the crystal must be tested for its proper frequency at frequent intervals. This final lapping was formerly accomplished by placing the crystal on a lap like those used in the machine, and moving it around with the finger. This method, however, was subject to all the irregularities of the earlier machine methods. Following the design of the new machine lapper, therefore, a new hand lapping outfit was designed and a new technique outlined that gave much improved results, and has greatly expedited the finishing process in the Western Electric plants.

The objectives of the design were to secure an even pressure over the entire face of the crystal, to allow the crystal to rotate as it passed over the lap, to have the crystal override both inner and outer peripheries of the laps at each passage across it so as to avoid the tendency to excessive grinding on the outer sections of the crystal, and to secure essentially even wear over the entire surface of the lap so that it would remain flat. None of these objectives were very satisfactorily attained with the earlier hand method. It was almost impossible to secure uniform pressure by moving the crystal with the finger, and rotation of the crystal was negligible. In addition, over-running of the lap was very irregularly if at all obtained, and the tendency to excessive grinding over

*RECORD, *June*, 1944, *p.* 435.

certain regions of the lap was always present.

To secure evenly distributed pressure on the surface of the crystal, a glass carrier was designed. This is shown at the right of Figure 1. One surface of this carrier is ground optically flat, and the other has a small indentation at the center. In operation, a wetted crystal is slid onto the flat surface to which it adheres, and is then placed on the lap with the carrier on top of it, and the crystal moved over the surface by placing the point of the stylus, shown at the left of Figure 1, in the socket in the top of the retainer. Pressure applied at this point is distributed evenly over the surface of the lap in contact with the crystal. Moreover, as the retainer is pushed around by the stylus, the effect of the friction is to rotate the crystal and the retainer, thus giving rotational motion in addition to that of translation.

To secure regulated over-shooting of the crystal at both inner and outer peripheries of the lap, a lap holder was designed that would permit the crystal retainer to move off the lap a fixed amount at both its edges. This holder, shown in Figure 1, has a low round projection in the center that fits inside the lap and holds it securely in place. Arising from the center of this projection is a cylinder that is smaller than the central opening of the lap by just the amount of over-carry desired. Around the outer periphery of the lap, and the same distance from it as the central cylinder is from the inner periphery, is a ring to limit the extreme outer position of the crystal retainer. The operating technique is to move the crystal in looping arcs between the outer and inner stops, and at the same time to carry it around the lap. Thirty small loops for one round trip of the lap are specified.

As may be discovered by reference to the article already referred to, this motion is almost exactly the same as that provided in the new precision machine lapper. In making the finishing laps, however, hand lapping is much quicker because the frequent removals of the crystal from the lap to test for frequency, while quite simple with the hand outfit, become complicated and slow with the machine. This new device and technique gives the speed of hand lapping and yet retains precision of the best machine lapping. Because of this advantage the time required to train girls for this hand lapping process has been drastically reduced.

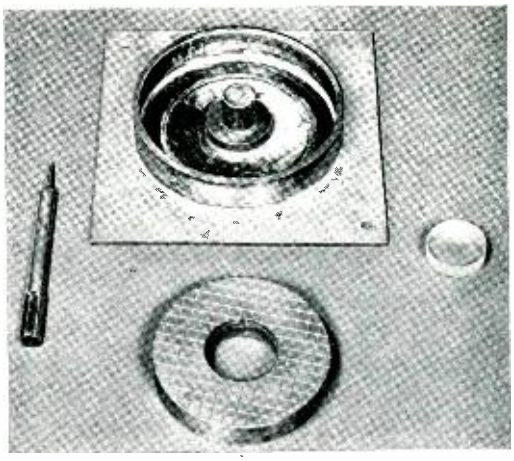
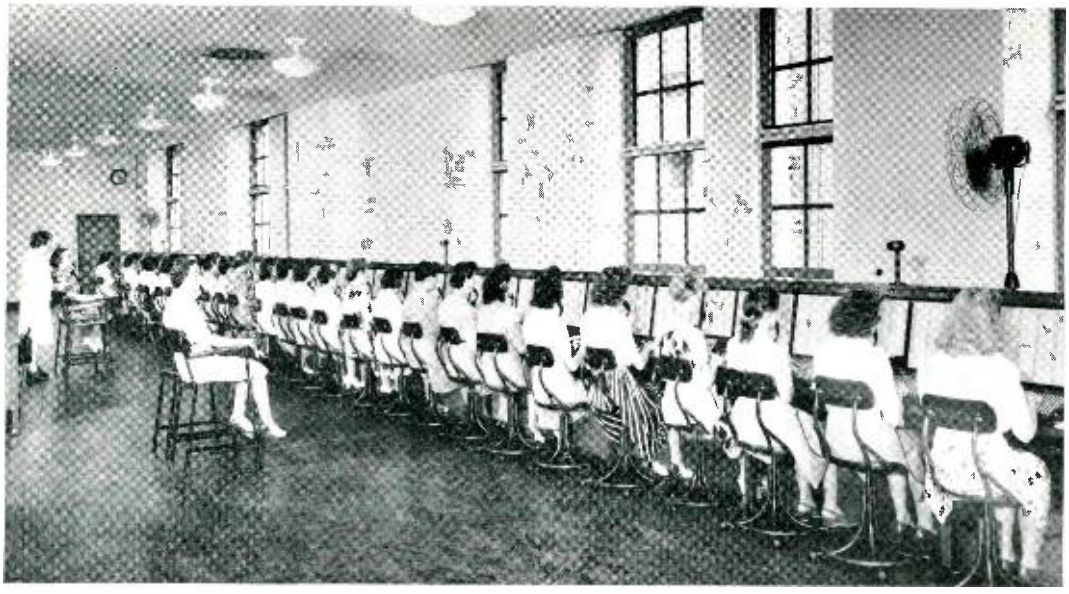


Fig. 1—The complete hand lapper includes the lap holder (above), the lap (below), the guiding stylus (left), and the glass carrier for moving the crystal (right)

THE AUTHOR: G. M. THURSTON of the Commercial Products Development Department entered the student course of the Engineering Department of the Western Electric Company in 1919. He then joined the radio research group where he was concerned with circuit development. He was associated with the development of transatlantic radio and in this connection made a field survey of the transatlantic short-wave project. He was also closely associated with the development of ship-to-shore radio, particularly the initial installation on the *Leviathan*.

From 1922 to 1926 he studied at Columbia University and in 1927 at the Polytechnic Institute of Brooklyn. Since 1930 most of Mr. Thurston's work has been concerned with investigations of quartz crystals. This has covered dimensioning and lapping techniques and the development of testing equipment.



Call Distribution to Crossbar Toll Operators

By F. A. PARSONS
Switching Engineering Department

IN THE new crossbar toll office, calls coming in over manual trunks are automatically routed to a cordless switchboard where operators set up the connection through the switching train by "writing up" the proper code on keys. In any such system, the general problem is to arrange the distributing circuits so that an idle operator can be promptly found and connected to the trunk regardless of the number of positions occupied at the time. On the other hand, the number of positions provided for any particular office and the number of them occupied for any existing load must be kept as small as practicable in order to avoid excessive operating and equipment costs.

Analysis shows that operating efficiency increases with the size of the group of operators, and thus the greatest operating efficiency is secured if all the trunks can be given access to all the positions. The amount of equipment necessary to give this universal interconnection becomes excessive, however, and economy frequently makes it necessary to divide the operators into groups, each group serving a portion of the incoming trunks. Although maximum efficiency is not secured when this is done, it can be approached fairly closely since the increase in efficiency tapers off as the groups become larger, while the cost of the equipment increases.

In the past, call distribution has been accomplished by using step-by-step, panel, or rotary switches, and the results have been very satisfactory. None of these methods could be readily adapted to the new toll office, however, because of the large number of leads per trunk that must be handled. Because of the exigencies of toll switching, a simple tap connection to the trunks is not adequate; the incoming trunk for a brief interval of the switching period must be carried to the switchboard and then back to the toll switching train, thus forming a loop. Because of the use of four-wire switching, moreover, and of other factors of the crossbar toll system, these operator loops each require sixteen leads, and this large number of leads cannot easily be obtained with any of the types of switches formerly used. In the crossbar toll office, therefore, crossbar link frames are used to distribute the calls to the

operators. Since the crossbar switches make six contacts at each crosspoint, the required sixteen leads are secured by using three crosspoints for each loop.

An extensive study of all factors involved led to the decision to use a group of forty operators as a maximum, and to give as many trunks access to this group as are needed for a suitable load. Ten-by-ten crossbar switches are used in a primary and secondary arrangement for the operator link frames according to the usual crossbar practice. Since three switching elements are required for each operator's loop, three 10 x 10 switches will handle ten loops, and thus twelve secondary switches will handle forty operator loops connected to the horizontal elements. Since the switches also have ten vertical units, there will be the same number of links from the primary switches as there are loops, and a total of twelve primary switches will also be required for each frame.

In the usual crossbar frame, links run from all primary switches to all secondary switches, but the operator link frame is split in two, forming an A half and a B half, and the interconnection of primaries and secondaries applies only within each half. The incoming trunks are connected to the horizontals of the A primary switches, but each trunk is also multipled to a primary of the B switches, and thus a single group of trunks is served by both A and B halves of the link frames, and thus have access to all forty loops. Because of the splitting of the frame into two halves, only one half is needed to illustrate the arrangement of trunks, links, and loops. This arrangement is shown in Figure 1, where the six secondary switches of the half shown are at the right, and the upper and lower of the six primary switches are at the left. The lower three secondary switches supply the sixteen conductors for each of ten loops, and the three upper, for another ten loops, and thus each half frame supplies twenty loops.

Each primary switch is split so as to form five units, each with ten horizontals and two verticals, and thus the six primary switches of each half frame provide thirty such two-by-ten units. Again because of the sixteen leads required, three of the two-by-ten units are used for each loop, and thus the thirty units provide for one hundred trunks —ten for each group of three two-by-ten units. The three two-by-five units for each set of ten trunks may not all be on the same switch; two of them may be on one and one on the switch above or below it.

In Figure 1, each line represents six wires, the number that can be handled by each crosspoint of the crossbar switches. If one line is allowed to represent all sixteen wires, the interconnections for a complete frame would be as indicated in Figure 2. Here, one ten-by-ten secondary switch represents three on the actual frames, and each two-by-ten

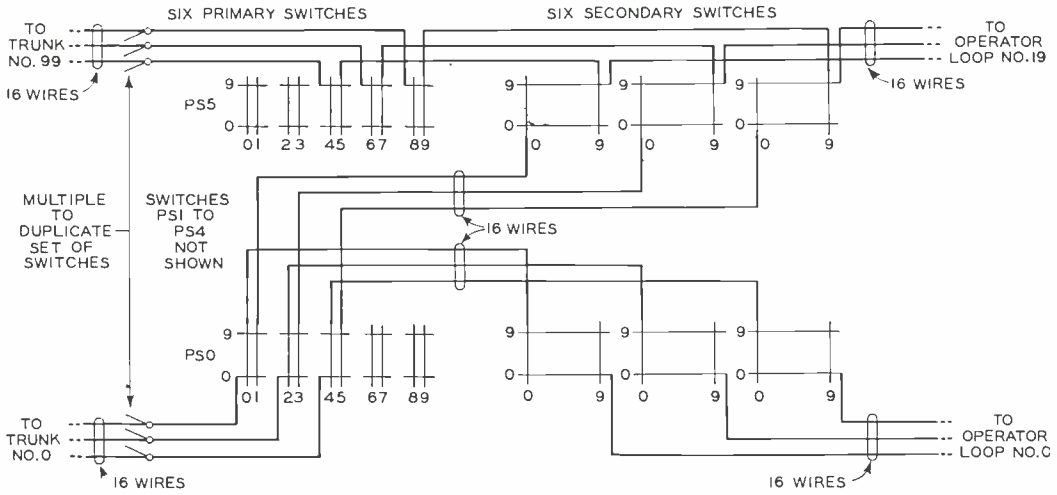


Fig. 1—One-half of operator link frame. Each line represents six wires, the number that can be handled by each crosspoint of the crossbar switches

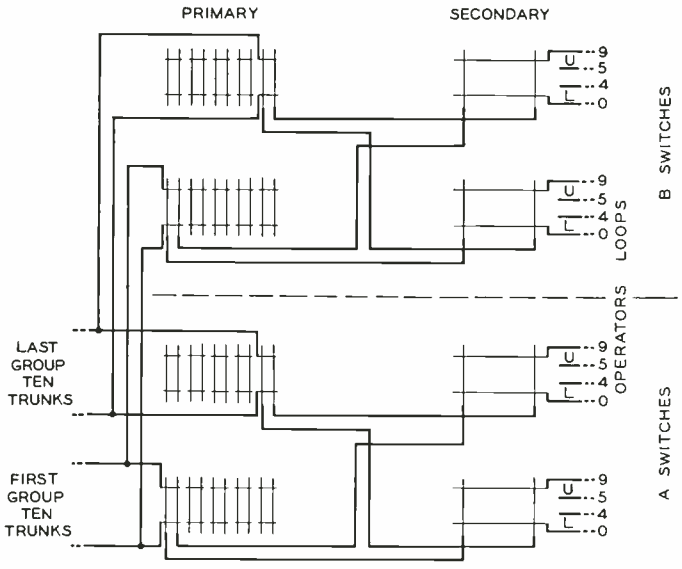


Fig. 2—Interconnections for a complete operator link frame

element of the primary switches represents three such switch elements on the actual operator link frame.

Such an arrangement gives one hundred trunks access to forty operator loops. Each operator's position, however, is served by three loops. This is done to permit an operator to be receiving a new call while the one she has just handled is being completed by her sender, or while she is holding a connection to one call that may require attention later. When the operator is actually engaged in handling a call, her three loops will be made busy, but one or two loops may be held for later attention without making the others busy.

With three loops to each of forty positions, there are one hundred-twenty loops in all. To provide this number of loops, three frames like that indicated in Figure 2 are required, and since each frame provides for one hundred trunks, a total of three hundred trunks is given access to forty positions. The three loops to each position are marked 0, 1, and 2, and all the No. 0 loops are connected to one of the three frames, all the No. 1 loops to another and all the No. 2 loops to the third. These three frames are called key-frames, and are numbered 0, 1, and 2 to correspond to the numbers of the loops they serve. Since forty operators can handle calls from more than three hundred trunks, other frames are added as needed. The horizontal terminals of the secondary switches of each added frame are multipled to one of the key-frames, but each of the additional frames serves a different group of one hundred trunks.

The use of key-frames permits a large part of the cabling to be run in permanently regardless of the number of trunks or of the number of positions that are actually occupied. When the maximum number of positions required is less than forty—only thirty-two are used for the Philadelphia installation—those secondary terminals of the key-frames that have no operator loops are multipled to terminals of one of the other key-frames that have a loop to an occupied position. This multipling is temporary, but it is needed only on the key-

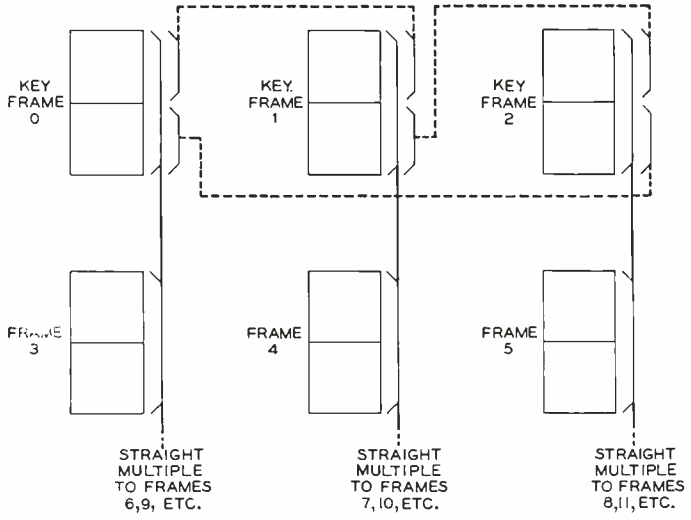


Fig. 3—Temporary multipling arrangements using the key-frame system are shown by the dashed lines. This multipling is removed when additional loops are required

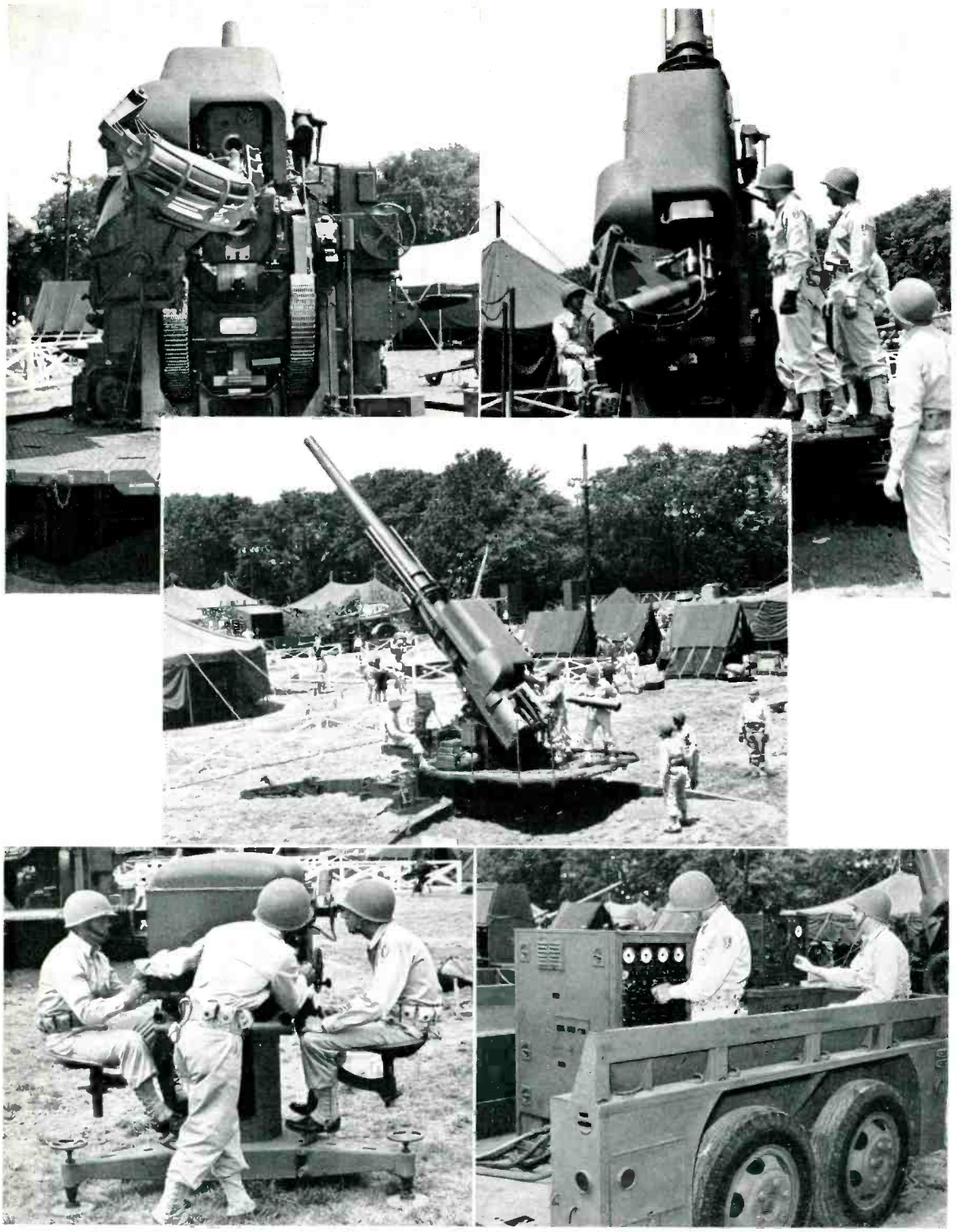
frames because each additional frame is permanently multipled to one of the key-frames. This temporary multipling is indicated by the dashed lines on Figure 3 which show the general scheme of key-frames. Should these unoccupied positions later be filled, it is necessary only to remove the temporary multipling, and run the additional loops to their assigned positions.

Forty operator positions will probably be sufficient for most of the toll crossbar installations. Some of the very large cities, however, may require more than forty positions, and to provide for them, a second arrangement has been devised that will handle a maximum of eighty positions. This is the arrangement provided at Philadelphia, for although there are only thirty-two positions at the present time, it is expected that the number will soon be greater than forty. The general scheme of arrangement for the eighty-position unit is similar to that for the forty, but six key-frames are used instead of three. These key-frames are divided into three odd and three even frames. The former handle the odd switchboard positions and the latter, the even. Thus, the forty odd positions of the board—positions 1, 3, 5, through 77, 79—will be served by the three key-frames Nos. 1, 3, and 5, while the forty even positions—2, 4, 6 through 78, 80—will be served by the three key-frames Nos. 0, 2, and 4. In this way, a doubling in size is possible without any radical difference in the general arrangement.

THE AUTHOR: F. A. PARSONS received the E.E. degree from Cornell University in 1937, and at once joined the Technical Staff of the Laboratories. After spending some time on relay design, and in the toll laboratories group, he transferred to toll facilities. Here he worked on the requirements for crossbar toll switching systems, and was intimately associated with the design of the No. 4 system recently installed in Philadelphia. In February, 1941, Mr. Parsons left the Laboratories on a military leave of absence, and is now a major with the Bomb Disposal Group of the United States Army.

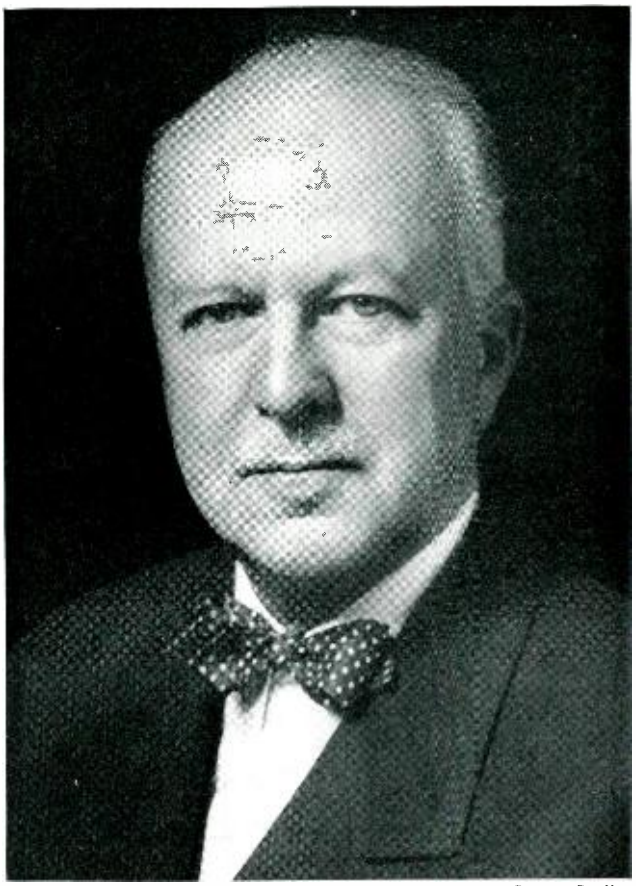
WAR BONDS AND THE LABORATORIES

For the Fifth War Loan Drive now under way and which closes July 8, the U. S. Treasury suggested as a goal an investment of $100 *in bonds per employee during the months of June and July. The Laboratories, however, through the decision of its Bond Committee, set itself a higher goal. It had been struggling to maintain a payroll allotment of* 10 *per cent of total pay including overtime. It had exceeded that during the Fourth Drive, through the three months' allotment. When these were completed its percentage dropped to about* 8½ *per cent from over* 10½ *per cent. For the Fifth Drive it set a goal of* 10 *per cent plus an extra week's standard pay—not including overtime—distributed through twelve weeks during July, August and September. This is a hard goal to attain but it is easy compared to the goals the boys are gaining in France, Italy and the Pacific. Can't we do that little extra? The Laboratories Bond Committee knows we can; and the statistics as of June* 23 *show that we are three-quarters of the way to the goal. Give a good hard push and the goal is reached.*



U. S. Army's latest anti-aircraft gun—the 4.7 inch, equipped with the M-10 Electrical Director designed by the Laboratories. Upper left, the projectile ready for its fuse to be set. Upper right, the fuse setter slides down, rotates the fuse to the proper position, and returns. The tray swings down into line with the breech; the lever at the left rams the powder charge and projectile and the breech closes. Center, gun drill at the Weapons-of-War show at Washington. Lower left, Tracker for the M-10 Director. Lower right, computer and altitude converter. Normally a tarpaulin over five bows roofs the trailer

President Gifford Completes Forty Years of Service



Conway Studios

JULY 5, 1944, marks the fortieth anniversary of Walter S. Gifford's service in the Bell System. As a young man about to graduate from Harvard in the year 1904, Mr. Gifford wrote a letter asking for a job with the General Electric Company. The business world and its connections were new to him and he made the mistake of addressing the envelope to the Chicago address of the Western Electric Company. In his letter of application he said, among other things, "Now if there is only some position (no matter what, provided there will be a fair chance for a rise if it is deserved), in the General Electric Company, I should like to try it and would endeavor to suit." This letter, though misdirected, won Mr. Gifford an interview and he was invited to file an application for a position with the Western Electric Company.

In the application form Mr. Gifford stated that his father was a lumber dealer in Salem, Massachusetts, and in reply to the question as to what work he would prefer and what special training he had fitting him for it, he said, "Good office work—no special training, however." As references he gave two of his professors at Harvard, the principal of his high school, and the family doctor. The letters of recommendation written by these men were all favorable, and one concluded with this sentence: "I judge him to be a man of promise." It was pointed out that he had entered Harvard when but sixteen years of age and had completed the four-year course in only three years, thus graduating at the unusually early age of nineteen. The principal of his high school said: "I can recommend him in the strongest terms to anyone desiring a reliable, honest, and hard-working young man." These recommendations, made by men who were without influence in the worldly sense, proved to be prophetic. Mr. Gifford's rise in the industry of his own choosing was as rapid and as brilliant as his scholastic career had been.

In July, 1904, he started with the Western Electric Company in Chicago as a clerk in the payroll department at a salary of $10 a week and two years later he came to the New York headquarters of that company as a clerk in the Secretary's office at $24 a week. Five years after entering the business he transferred to the American Telephone and Telegraph Company in Boston and did general accounting work at a salary of $275 per month. His rise in the Company to the positions of Chief Statistician, Comptroller, Vice-President, and finally to that of President, bears testimony to his industry, integrity and ability.

Mr. Gifford entered the business un-

known. Neither in his employment nor in his subsequent rise did family influence or the influence of so-called "powerful interests" play any part in his development. By the application of his outstanding talents to the tasks which have confronted him, he has reached his present position of leadership in the business world, and by his unfailing courtesy and kindness he has won a warm place in the hearts of all who know him.

Vail Medal Awards for 1943

Telephone work is not normally hazardous, but emergencies do arise, and hardly a day passes without a striking example of courage, resourcefulness, or devotion to duty on the part of a telephone worker somewhere. Those telephone people who distinguish themselves through outstanding "acts of noteworthy public service" receive awards that are provided by the Theodore N. Vail Memorial Fund.

For 1943, twenty-six awards were made to telephone men and women—and six of these awards were for especially conspicuous merit. The citations accompanying the higher awards were:

"To Frederick Richard Hoffman, of The Chesapeake and Potomac Telephone Company of Virginia, for initiative and prompt, intelligent and courageous action in the rescue of a man who had come in contact with a high voltage wire, a silver medal and five hundred dollars."

"To Louis G. de Lyon, Alfred H. Gerlach, Alexander Mikolasy, William Mohrhoff, and Louis J. Rom, all of the Western Electric Company of New York, for prompt action, initiative and extreme courage in the face of grave personal danger during an emergency prior to and following an explosion of hydrogen gas, each a silver medal and five hundred dollars." Of this group, Mr. de Lyon gave his life, and the award is presented posthumously to his wife, Mrs. Elfrida J. de Lyon.

In addition, a group of Southwestern Bell Telephone Company employees has received special recognition. They remained on duty under extremely trying conditions after an explosion in the Jefferson Central Office building at St. Louis where they worked had demolished walls, shattered glass, and filled the building with dust, smoke and fumes.

During a recent visit at Murray Hill, Mr. W. B. Bell, President of the American Cyanamid Company, and Dr. R. B. Barnes of his staff were accompanied by Dr. Buckley and Mr. C. P. Cooper, Vice-President of the American Telephone and Telegraph Company. In the photograph, Mr. Bell stands at Dr. Buckley's right and Mr. Cooper is at his left. In the back row, from left to right, are R. R. Williams, R. M. Burns, R. A. Haislip, W. H. Martin and Dr. Barnes

With Our Armed Forces Around the World

Lieut. Commander Clarence Unnevehr

COMMANDER UNNEVEHR spent a day at West Street recently while on leave. This was his first return to the States in almost two years. He left the Laboratories in November, 1940, and has since seen a great deal of action in the South Pacific. He participated in the battle at Rennell Island which was a part of the Guadalcanal campaign. Later he also saw action in the New Georgia and Bougainville campaigns. He expects to return to the Pacific area.

Major Frank A. Parsons

One of the most interesting, and probably the smallest branch of the United States Army, is the Bomb Disposal Group. Most of the men in this group have an engineering background. MAJOR FRANK A. PARSONS, a member of the Laboratories, is now in England with this unique group.

When Major Parsons first came to the Laboratories he spent some time in the relay design and the toll laboratories groups before transferring to the Toll Facilities Department where he worked on requirements for toll crossbar switching systems. When Mr. Parsons left the Laboratories for the Army, he was sent to the Aberdeen Proving Ground in Maryland where he was in charge of instruction on a pistol range.

Later he went to England during the "Blitz" to study at first hand the work of the Bomb Disposal Group. He returned then to the Aberdeen Proving Ground to become director of research for this group there. Major Parsons, for having taken apart an unexploded bomb in England, wears the special Bomb-Disposal insignia on his sleeve—a red bomb outlined in yellow on a dead-black background.

All Bomb Disposal men are volunteers, though only officers do the actual nerve-tingling job of taking the "cranky" things apart. A colonel in this group remarked, "In our branch of the service you only make one mistake. You're either an expert or you're dead."

Lieut. Col. W. J. Galbraith

"Just a line to the gang to let you know that I can tell you I am in India, in the CBI (China-Burma-India) Theater. Had a very long but interesting trip and saw quite a bit of the world on the way. India is an interesting country with its native bearers carrying immense loads on their heads, everyone chewing betel-nut. I suppose this is the hottest part of the year and soon the monsoon season starts, which is just about as hot and more humid."

Lieut. Col. J. M. Hayward

"The trip down here to Australia was unbelievably fast considering the distance. Once we took off from the West Coast we were in the air almost constantly by night or day. The time spent on the ground during the four stops we made was very short, with the exception of the stop at Guadalcanal where we had a little more time to clean up,

H. V. Berlin Lt. George Bukur

We regret that in last month's issue a photograph of H. V. Berlin with Lieut. George Bukur's name under it was published. Both are overseas, Private Berlin somewhere in the Pacific and Lieut. Bukur in China

shave and eat at a table. Without any scenery to look at other than water and clouds, we passed the time reading, sleeping, eating or playing gin-rummy. The fall weather here is very mild and clear. The hotel accommodations in the one I'm in—reserved for colonels—are the kind my grandfather might have enthused about and the food just is not prepared properly. I doubt if I will be here long enough to get used to walking and riding on the left side of the street, and the money, in pounds—shillings—pence—with the florin (2S) and ha'penny too, are still confusing me. Have yet to see a kangaroo or a fuzzy-wuzzy, but soldiers and women in uniform rule the town at all times. Best regards to all."

Lieut. George Bukur

Lieut. George Bukur writes from somewhere in China, "I finally arrived safely and in good shape. I'm sure I'll never want to travel again when I get home! I used about every mode of transportation known before finally reaching my destination.

"China is a very interesting country and much better than India as far as food and climate are concerned. I am at an American camp where the food and quarters are fair. My knowledge of Mandarin helps a great deal and I am now an instructor in the language. The surrounding terrain is indeed beautiful. My only regret is that I have no photographic equipment to record some of the unusual things I have seen.

"Chinese ten dollar bills are worth eight cents in our money. There is very little to buy here in the way of souvenirs, and what there is costs outrageous prices.

"Our daily program is a long one, with breakfast at 5:30 a.m. and supper at 6:00 p.m., so don't gripe about overtime in the office! If you think a uniform is glamorous, you should see it when one is standing in three feet of mud. You haven't lived until you've eaten water buffalo. It would taste like leather in the States but it's heaven over here."

Bertrand H. Sommer

Cadet-Midshipman Bertrand H. Sommer of the Merchant Marine returned to visit West Street recently, after two seven-month cruises in the Mediterranean.

Leaves of Absence

As of May 31, 846 members of the Laboratories have been on military leaves of absence (see page 463), of which 33 leaves have been completed. The 813 active leaves were divided as follows:

Army 489 Navy 240 Marines 30
Women's Services 54

There were also 17 members on merchant marine leaves and 27 members on personal leaves for war work.

Recent Leaves

United States Army

Robert Beattie	James F. Madden
John J. Cozine	Henry G. Petzinger
Betty J. Dean	Joan E. Schubert
Albert H. Diegler	Frederick A. Soltow
Edward J. Dixon	Albert R. Strnad
Howard S. Hopkins	William A. Sumner

United States Navy

Donald E. Blesse	Ensign F. W. Lindberg
Eugene J. Breiding	Domenick Maccia
Edward A. Hake	Peder M. Ness
Herbert E. Henrikson	T. T. O'Shaughnessy
Paul A. Hopf	Seferin E. Pulis
William E. Howard	William L. Rohr
Joseph Kocan	Ellsworth R. Rosen
Edward B. Kopetz	Herbert L. Smith

David J. Van Slooten

United States Marine

Honora T. Ferris

During his trips he stopped at a number of ports in Italy, Sicily, and North Africa. The surprise German raid on the Allied port of Bari, Italy, last December took place just the day before Sommer arrived there. His was one of the first ships to enter the harbor after the bombing.

He spent Christmas Day in Bari, where he received one of his copies of the RECORD. New Year's Day he spent in Augusta, Sicily, where he found that the city had been bombed by the Germans during a raid the previous day.

The cruises were a part of his preliminary training. Cadet Sommer will now take further training at the Merchant Marine Academy in Long Island. When he has completed the course he is taking there, he will be commissioned a Third Officer in the Merchant Marine or an Ensign in the Naval Reserve.

Fred W. Hold

FRED HOLD writes from the South Pacific, "Have moved about on this hot and humid jungle island quite a bit—done some flying over tremendous mountain ranges and blue-green seas. It is a wild and unhospitable country, largely unexplored, with a most unpleasant climate. I can't tell you where I am now or have been, of course, but the jungle everywhere presses in closely. Few wild animals are to be seen—just some wild pigs, wallabies (miniature kangaroos), and lots of snakes. We shot several snakes recently. Two were four feet long, and one over thirteen feet by actual measurement. It took five men to hold the largest one up for camera shots.

"At last I am now doing the work I came to do. It is a real pleasure to work with Bell Lab prints, texts, and KS parts again. I am in charge of a base shop here where we maintain and repair a highly specialized bit of equipment. It is not particularly strenuous, but each problem is a challenge and it takes all my electrical experience plus the training that I had received in the Laboratories to find the trouble."

Robert Kemple

"When I came back from furlough I started on a five-week course of intensive training. In that short space of time I learned the basic principles of jungle warfare. Recently, however, I was sent to Silver Springs, Florida, with a detachment to help in the filming of a motion picture of

Lieut. Frank L. Krzyston, front row extreme right, is now overseas

the Navy. I had the pleasure of being in the company of men who have fought in all the major engagements of the South Pacific. I can honestly say that I learned more, from my short association with those men, than I have since I've been in the Marine Corps. You yourself would thrill to hear some of their stories. The picture took only a short time to film and as a result, after only three weeks, I found myself back with my old outfit. I wish I could tell you what the film was about and what we Marines did, but I have promised to keep all that information to myself as it is a military secret."

Lieut. Sherman T. Brewer

"The Fighter Control Squadron in my address gives as clear a picture of my work as is permitted. I have had a good deal of field experience in this type work since the North African campaign started, working with both American and British personnel. I had the great good fortune of being one of two officers from this theater who were selected to return to the States for special schooling. I had six weeks there, and spent two days at the Labs visiting the old gang."

Lieut. Thomas Pariseau, stationed at Gore Field, Mont., recently announced the birth of "Tommy III"

Robert R. Stephens

"School is darned interesting and I really like it. I graduated third in the class from Grove City, first Marine, but two sailors beat me, with a 95.7 average.

"I'll really be in shape when I leave this place. It's a second boot camp. Parris Island exercises, Judo lessons, obstacle course, aerial gunnery practice, run the island

LT. EDWARD FILIPOVITS LT. S. T. BREWER

(three miles), drill under arms—and some flying time. And it really tires me—I sure am soft after being in the hospital so long. But I'll toughen up."

Military News

CHARLES H. DOERSAM, JR., has been given a personal leave of absence to work with the Naval Research Laboratories.

LIEUT. THOMAS M. PEPE and JOSEPH A. FAIRBROTHER have been transferred from the Navy to the Marines.

LIEUT. COL. WARD K. ST. CLAIR has been stationed for some time at New Delhi, India, with the U.S.A.F. of the China-Burma-India Command. A recent letter states that he is recovering satisfactorily from a severe illness.

HARRY W. DOHLMAR is now with the Seabees in the Hawaiian Islands, doing electrical work there. "I have been receiving the RECORD quite regularly. The December and January issues containing articles on the development of the Electrical Director were especially interesting, as they brought back memories of the days when I was working with the group that developed it."

BETTY KENNY from the Accounting Department has been sent to the Naval Air Station at Pensacola, Florida, for a course in Aviation Free Gunnery Instruction.

Recent visitors included Lieut. Edward Filipovits, formerly of the "Model Shop," who hopes to fly a P-47 pursuit plane shortly; and Lieut. Arthur Palmer of the same department who received his wings at Craig Field; Peter Shearer on furlough from Camp Robinson.

Thomas J. O'Neill is stationed somewhere in England.

Robert S. Williams now is in the Signal Corps O.C.S. at Red Bank, New Jersey.

Joseph P. Reddington is "just about over the hardest hurdle of the Marine Corps —boot camp—at Parris Island, South Carolina."

Harold W. Raimert writes, "I have just completed five months of sea duty on board a merchant ship acting as the Navy radioman. We stopped at several interesting places including Egypt, Arabia, Ceylon, and India. The old saying, 'Join the Navy and see the world,' fitted my experiences perfectly. At present I am a candidate for the Navy's V12 officers training and will start college in July."

"My particular work is still in the interests of bettering the communications facilities of the Naval establishments,"

Lt. Arthur Palmer Peter Shearer

writes Lieut. Commander Ralph H. Miller from Washington, D. C.

Emil Ellingsen now has a New York A.P.O. address.

"England is a nice place in the spring," writes Alfred Wickstrom, "but I'll take New York any time!"

Steven F. Lubniewski is with a Field Artillery Company overseas.

Robert T. Duffey visited the Laboratories when he was in New York recently.

In thirteen months of Army life Walter Sokolosky has been stationed in twelve different bases. His most recent one is Bradley Field, from which he expects to be sent to a port of embarkation for overseas duty

Warren E. Wilson reports, "I must say, it is interesting training here at Camp Wolters, Texas, in spite of the heavy work. Give my best to all of the gang at the Labs, and tell them to write."

Aviation Cadet Thomas R. Harden writes that he is now at the State Teachers' College in Fitchburg, Mass., taking elementary flight training.

From a Signal Training Regiment at Camp Murphy, Florida, Harold H. Hoffman writes, "There's plenty of work for us to do but an occasional trip to West Palm Beach ought to break the monotony."

R. J. LaFrance is in a Seabee Battalion somewhere in the Southwest Pacific.

Victor Silzer has become * * * instructor at the Boca Raton Field Air Base in Florida.

"My present assignment as a flight instructor is very pleasant and at times interesting," writes Ensign J. R. Boyle, who is now stationed at the Naval Air Station in Glenview, Illinois.

The Record has been notified that Lieut. Colonel William H. Edwards has received orders for active overseas duty.

Lt. K. E. Waters

W. G. Pimpl

Robert Eichhorn

Capt. F. B. Monell

Thomas Fox

Louis Bell

Ethel McAlevey of the Wac writes, "Spent a very enjoyable furlough in Edinburgh, and from there went to Loch Lomond for a day."

James J. Viggers has been transferred to Camp Plauche in Louisiana. He sends "Regards to the boys in the coil room."

Charles Hempel, stationed at Camp Blanding, Florida, writes, "I received my May issue of the Record. In it I saw a picture of Watson Richardson, and I would like to say hello to him through the Record."

Lieut. Kenneth E. Waters is overseas with an A.A.A. Battalion; William G. Pimpl is now overseas with New York APO number; Robert D. Nostrand is on active sea duty; John Marko, A.S.T.U., is at Randolph-Macon College, Ashland, Virginia; and Frank Sardinha is with the Merchant Marine.

Aviation Cadet James M. Hoagland, Jr., has completed his college training course at Syracuse University and is awaiting assignment for pre-flight training.

Ensign Frank W. Lindberg, who recently completed training in the Merchant Marine, receiving his commission at Fort Schuyler, is now on active sea duty with the Navy.

On a recent visit to the Laboratories Aviation Cadet Joseph Kelly told that he has completed his primary flight training at the Bunker Hill Naval Air Station in Peru, Indiana, and now expects to be sent to Pensacola, Florida, for advanced training.

Robert Eichhorn visited West Street before leaving for Corpus Christi, his last basic training base, where he hopes to win his wings.

Recent visitors to West Street have included Robert Seymour, who trained at Camp Crowder in Switchboard Operation and Installation and is now overseas; John A. Zweig, who is assigned to Camp Reynolds replacement center; Lieut. Thomas B. Horton, recently commissioned pilot at George Field; and Frank C. Wanits.

Thomas Fox, on a visit to West Street, had many interesting experiences to relate about students whom he instructs at Fort Monmouth. At one time he had a trapper

J. A. Zweig

F. C. Wanits

JOHN MARKO

FRANK SARDINHA

from the Northwest who was to learn how to repair telephones and switchboards—and the man had only seen three telephones in his life before joining the Army.

As CUSTODIAN of enlisted men's service records at New Castle Army Base, LOUIS BELL has learned much about personnel work, he said when he visited the Laboratories recently.

WILLIAM L. FARMER, JR., has been selected by the Army to study medicine. He is now taking a Pre-Medical Course at State College, Pennsylvania.

CPL. EDWARD H. BUEB from a San Francisco A.P.O. number says, "Greetings from a far corner of the world. Although a long distance away we have been getting V-mail letters at an average of ten days from New York City."

RUTH RYDBERG of the Marine Corps Women's Reserve sends regards to everyone at the Laboratories.

THEODORE J. WEST is now overseas with a New York A.P.O. address.

AVIATION CADET MARTIN E. JOHNSON writes: "Upon completion of my pre-flight training at Chapel Hill last month, I moved on to the Naval primary air base located at Grosse Ile, Michigan, where I'm getting my first taste of real flying."

ENSIGN ROBERT H. LIGHT, now stationed at Princeton, says he is learning from the ground up the "whys" of some of the equipment the Labs are building.

COMMANDER RODMAN D. DEKAY writes that he is "still paddling around in the Pacific, looking for Japs."

HENRY WIDMANN is in a Submarine Division of the Navy with a San Francisco post office address.

CAPTAIN FREDERICK B. MONELL has completed courses at the Signal Corps School at Fort Monmouth, and is now overseas; LIEUT. WILLIAM H. BURGESS now has a New York A.P.O. address; and WARREN E. THACKER sends regards to his friends in the Labs from Camp Claiborne, Louisiana.

DONALD J. OAKLEY, in the Navy, writes, "I am stationed at a Naval Air Base in the South Pacific."

C. H. HAMANN of the Navy is now on active sea duty.

LT. T. B. HORTON

ROBERT SEYMOUR

ENS. F. W. LINDBERG

J. M. HOAGLAND, JR.

LT. W. H. BURGESS

R. D. NOSTRAND

RICHARD RAFFERTY LT. R. F. HEALY

AFTER SPENDING seventeen months in New Guinea, LIEUT. PAUL MALLERY rather hopes his next address will be from another climate, preferably New York.

RECENT PROMOTIONS among members of the Laboratories in the service: LIEUTENANT EVERETT C. WALSMAN; MARILYN PEARSON, Aviation Machinist's Mate 2/c in the Waves; SGT. J. B. KENNEDY, Technician Fourth Grade rating; LIEUT. COLONEL THOMAS A. MCCANN, now serving overseas, attached to General Eisenhower's Headquarters; SECOND LIEUT. GEORGE N. ELTZ in the Air Forces; CAPTAIN LEROY G. RAINHART; SECOND LIEUT. GREGORY CHABRA in the Air Forces; LIEUT. COMMANDER HARRY C. HART, U.S.N.R.; LIEUT. COMMANDER JOHN R. SACKMAN, now overseas with a San Francisco Post Office address; FIRST LIEUT. RALPH D. HORNE, JR., pilot of an Eighth A.A.F. Flying Fortress, now in England; SECOND LIEUT. ROBERT F. HEALY; SECOND LIEUT. GERARD E. DAVIS; STAFF SERGEANT WILLIAM M. EHLER.

LIEUT. ROBERT F. HEALY, who was commissioned a pilot at Victoria, Texas, has been assigned to Enid Air Field as an instructor. During his leave, Lieut. Healy visited the Photocopy Department where he was employed before entering service.

RICHARD RAFFERTY is taking a specialist training course in the operation of the Electrical Gun Director at Aberdeen Proving Ground in Maryland.

CAPT. ERNEST C. GRAUNAS, now in Australia after a "short stay in New Guinea"; LIEUT. COLONEL R. O. FORD, from a New York A.P.O. address; ROBERT S. DRYDEN, now overseas; L. M. CASSANO in the Seabees; THOMAS J. O'NEILL, now in England; LIEUT. COL. MALCOLM A. SPECHT, on temporary duty, expects to return to the States some time this summer; ALFRED O. SCHWARZ, from an advanced area of the Pacific; RAYMOND S. YERDEN, now overseas in the Marine Corps.

OTHERS WHO have written to the Laboratories included:

Harold Jaffee, G. C. Barry, Isabelle M. Kennedy, Captain B. M. Froehly, S/Sgt. C. E. Underhill, W. M. Ehler, Adele Aboutok, K. G. Oestreicher, K. A. Josephson, Edward Schoum, Grace M. Connor, Kay R. Parsons, Lieut. G. M. Richards, James Campbell, Alfred Bertin, A. F. Schweizer, R. F. Logan, W. F. Edwards, Jr., H. C. De Valve, Jr., Lt. P. W. Foy, D. W. Webster, P. A. Walz, J. R. Merchant, Matthew Tomb, W. E. Springer, R. F. Rennick, Lieut. Commander J. B. Newsom, E. J. Moskal, J. H. Geiger, W. R. Frees, Sara Dolin, L. J. Antonucci, R. H. Funck, W. B. Sage.

Addresses Wanted

MEMBERS OF THE LABORATORIES on military leaves of absence who haven't been receiving the RECORD due to incorrect addresses are given below. The editors would like any information concerning them.

George A. Carlson	Richard H. Koehn
Stanley W. Erickson	Ellsworth A. Lichtenberger
David N. Fulton	Peter F. McGann
Leon M. Goldfeder	Frank Sardinha
Warren J. Goldstein	Robert C. Shopland
Ralph D. Horne	James R. Walsh

Lieut. and Mrs. Gregory Chabra, both of the Laboratories, had this picture taken during a visit to West Street, shortly after Lieut. Chabra won his wings. He is now at the Naval Research Laboratory in Washington

News Notes

F. B. JEWETT, on May 17, addressed the meeting of the Esso Research Club at Elizabeth on the subject of *Some Applications of Physics and Engineering in the War Effort.* On May 22 he attended the preview of the Second Edition of the Air Power Show of the Army Air Forces at the New York Museum of Science and Industry, and, as President of the Museum, made the opening remarks. On the evening of May 24 he spoke before the Maryland Historical Society in Baltimore on the subject *One Hundred Years of Electrical Communication in the United States.* This meeting was in celebration of a joint centennial of the founding of the Maryland Historical Society and the sending of the first telegraph message by Morse from Washington to Baltimore.

A page abstract of Dr. Jewett's address, *The Promise of Technology*, presented in the second series of conferences on *Post-War Goals and Economic Reconstruction* held under the auspices of the Institute on Post-War Reconstruction of New York University, was published in the April 22 issue of *Nature* (London).

O. B. BLACKWELL represented the Laboratories at the Centennial Telegraph Dinner which was held in Washington.

W. FONDILLER, G. B. THOMAS, and R. J. HEFFNER attended the evening session of the annual meeting of the National Industrial Conference Board in New York City on May 18. This session was devoted to an exploration of the *Opportunities and Problems of Post-War Employment.* Afternoon conferences on related subjects were attended by Mr. Heffner, J. S. EDWARDS and C. W. F. HAHNER.

THE LABORATORIES assisted the New York Telephone Company in providing an exhibit of communications apparatus at New York University in connection with their recent Morse Centennial celebration.

CHARLES MCLENDON, Editor of *Popular Science Monthly*, together with two of his associates, R. C. WILSON and GODFREY HAMMOND, visited Murray Hill.

MAJOR N. H. SLAUGHTER, formerly a member of the Laboratories staff at which time he was active in early radio developments, also visited Murray Hill. He was accompanied by Dr. D. H. Teeter and Dr. H. C. Pollack of the NDRC.

THE 1944 ROSTER of officers and committee membership in the Institute of Radio Engineers follows: *Treasurer*, R. A. Heising; *Board of Directors*, F. B. Llewellyn; *Admissions*, Lloyd Espenschied and F. A.

June Service Anniversaries of Members of the Laboratories

10 *Years*

C. F. Chapman
C. I. Cronburg
R. A. Desmond
T. J. Dorsey
C. E. Du Bois
J. H. Heiss, Jr.
W. A. Jakob
Viggo Marcussen
J. H. Ross
Margaret Wehner
E. J. Yacunski

15 *Years*

W. J. Albersheim
H. L. Barney
J. C. Blank, Jr.
M. E. Campbell
G. J. Christ
R. A. Cushman
W. H. Doherty
A. R. Ell
N. S. Ewing
I. E. Fair
W. P. Fengler
Polo Grafal
J. J. Hanley
G. J. Heinzelman
W. G. Hensel
R. J. Hluboky
A. B. Horgan, Jr.
L. C. Hosek
Clara Imler
J. A. Kater
James Keegan
Eunice Kiefer
L. M. Klenk
W. J. Lyons
Neil McLaughlin
D. A. McLean
J. M. Meehan
A. F. Pomeroy
W. C. Prendergast
Iru Price
Alice Reilly
Marjorie Remsen
Julius Rohr
P. W. Rounds
W. H. Scheer
Frederick Schrepfer
J. G. Segelken
H. G. Seifried
W. H. Shad
J. J. Shindle
W. L. Shull
A. M. Skellett
A. H. Smalenbach
R. R. Stevens
W. J. Thompson
W. H. Tidd
Alice Todd
C. T. Wyman
Elma Ya Deau

20 *Years*

C. E. Barker
J. F. Chaney
A. R. D'heedene
E. K. Eberhart
C. G. Emery
E. B. Ferrell
L. O. Goodman
R. M. C. Greenidge
L. L. Lockrow
Abe Maiman
R. H. McMahon
R. E. J. Poole
F. W. Reynolds
Dorothy Storm
Wendelin Weisser
W. E. Whitworth
L. S. Youngling

25 *Years*

G. C. Berndt
B. O. Browne
H. E. Coffin
Charles Gittenberger
J. M. J. Harriot
C. M. Hemmer
H. J. Kostkos
D. H. Mann
A. S. Miller, Jr.
V. L. Ronci
H. O. Siegmund
R. F. Squires
V. P. Thorp

30 *Years*

F. J. Boyle
H. C. Harrison
A. N. Jeffries
H. L. Lundberg
A. C. Satter
C. G. Von Zastrow
R. H. Wilson

35 *Years*

H. H. Lowry
John Murray
R. L. Quass
H. C. Spryer

40 *Years*

A. G. Kingman

45 *Years*

C. G. Spencer

Polkinghorn; *Awards*, R. K. Potter; *Board of Editors*, G. W. Gilman, F. B. Llewellyn, E. L. Nelson, E. C. Wente, G. W. Willard and William Wilson; *Constitution and Laws*, R. A. Heising, chairman; *Executive*, R. A. Heising, vice-chairman, and F. B. Llewellyn; *Investment*, R. A. Heising, chairman; *Membership*, W. H. Doherty; *Nominations*, Ralph Bown, chairman, and F. B. Llewellyn; *Papers*, F. B. Llewellyn, chairman, H. A. Affel, F. W. Cunningham, E. B. Ferrell, D. K. Martin, G. G. Muller and S. A. Schelkunoff; *Public Relations*, P. B. Findley; and *Sections*, R. A. Heising, chairman, and F. A. Polkinghorn.

Technical committee memberships are as follows: *Annual Review*, C. R. Burrows; *Electroacoustics*, G. G. Muller, chairman, and L. J. Sivian; *Electronics*, E. L. Chaffee, S. B. Ingram, A. L. Samuel and J. R. Wilson; *Facsimile*, Pierre Mertz; *Radio Receivers*, H. B. Fischer; *Radio Wave Propagation*, C. R. Burrows, chairman; *Standards*, C. R. Burrows and G. G. Muller; *Symbols*, C. R. Burrows; *Television*, A. G. Jensen; and *Transmitters and Antennas*, J. F. Morrison and J. S. Schelleng.

K. K. DARROW has been appointed a member of the Committee on American Scientific and Technical Bibliography of the National Research Council to compile a bibliography of American scientific and technical books. This work is intended to provide book-sellers and libraries throughout the world with an annotated catalog of the best American books in those fields.

"Business has picked up 100 *per cent since I added the signs"*

Your Copy of the RECORD

Please put your RECORD in the "Correspondence-Out" box when you are through with it so that it can be sent to a Serviceman's family.

K. G. COMPTON presented a paper, *Corrosion Protection of Metals*, before the Ontario Chapter of the American Society for Metals.

D. A. MCLEAN, accompanied by R. P. LUTZ of Hawthorne, visited the Mount Holly, Pa., plant of the Schweitzer Paper Company to discuss capacitor problems. G. T. KOHMAN and Mr. McLean later visited their Elizabeth plant for the same purpose.

E. C. LARSEN attended a symposium, sponsored by the Powdered Metals Association, on powder metallurgy, held at the Waldorf-Astoria.

G. H. WILLIAMS visited Hawthorne in connection with plastics and adhesive matters and G. GOODMAN on problems connected with the production of ceramics.

R. G. HUMPHREY, formerly of the Chemical Laboratories, has been transferred to the Hudson Street plant of the Western Electric Company as division chief of the Vacuum Tube Shop.

C. V. LUNDBERG visited Point Breeze and Kearny to confer on thermoplastic rubber tape developments.

S. B. INGRAM was the author of *Electronic Circuit Design*, published in the May issue of *Electronics*.

G. C. SOUTHWORTH spoke on *Recent Researches and Post-War Radio* at a meeting of the Yale chapter of Sigma Xi on May 17. Before the Dayton Chapter of the Institute of Radio Engineers, at a meeting held on May 25, he discussed *Microwaves and the Hollow-Pipe Technic*.

R. G. MCCURDY, H. O. SIEGMUND, N. Y. PRIESSMAN, C. B. GREEN and J. R. FLEGAL discussed thermistors at the Naval Ordnance Laboratory in Washington.

AT THE Hawthorne Plant of Western Electric Company in Chicago, W. J. KING discussed high-voltage cables and connectors; C. A. WEBBER, cables; and A. J. GROSSMAN, special networks. Mr. Grossman also went

to the Derry (Pa.) plant of the Westinghouse Electric and Manufacturing Company on matters pertaining to ceramic bushings.

H. H. GLENN and H. H. STAEBNER conferred with engineers of the Bureau of Ships in Washington on cord and cable specification requirements. Mr. Staebner was also at Point Breeze on cord-design problems.

R. T. STAPLES, at the Boston Insulated Wire and Cable Company, discussed special types of cables.

R. R. MACGREGOR visited the Camp Evans Signal Laboratory and the Fort Monmouth Signal Laboratory in connection with tests on transformers.

J. F. NUNER, at the Magnetic Windings Company at Easton, Pa., discussed transformer problems.

A. B. HAINES visited the Sharon plant of the Westinghouse Electric and Manufacturing Company on moisture-proofing of transformers.

C. A. MCJOHNSTON, with H. W. Budenbender of Hawthorne, visited the Line Material Company at Zanesville, Ohio, in regard to the manufacture of transformers.

J. E. RANGES visited the Pittsburgh plant of the Westinghouse Electric and Manufacturing Company on matters pertaining to hermetically sealed terminals.

J. R. BARDSLEY was at Hawthorne in connection with the approval of tool-made samples of loading-coil cases.

M. WHITEHEAD visited the Aerovox Corporation at New Bedford, Mass., to discuss electrolytic capacitors.

F. W. CLAYDEN and P. T. HIGGINS visited the step-by-step telephone offices at Sharon, Pa., and Jacksonville, Fla., in connection with step-by-step field studies.

R. C. JONES was at Point Breeze to discuss substituting synthetic rubber in type-J carrier cables.

A. L. FOX, A. L. RICHEY, J. H. GRAY, F. D. WALDRON and B. DYSART visited Princeton in connection with experimental installations of coaxial cable.

V. B. PIKE visited Chicago, Cleveland, and Detroit with reference to the improvement in drainage switches installed to minimize damage by electrolysis of lead-covered underground cables.

C. H. AMADON, with P. J. Buch of the A T & T, went to Richmond to discuss the inspection of poles with engineers of The Chesapeake and Potomac Company.

National Safety Council

R. H. COLLEY presided at the Annual Meeting of the American Wood-Preservers' Association at Chicago. He also visited the Forest Products Laboratory at Madison, Wisconsin, and the Valentine Clark Corporation at St. Paul to discuss problems relating to the preservation of timber.

J. W. VAN DE WATER, field engineer of the Quality Assurance Department at Omaha, recently received a letter from W. R. Johnson, vice-president and general manager of the Northwestern Bell Telephone Company, commending him for his assistance in restoring telephone service at the Norfolk (Nebr.) central office following a serious flood. In charge of fire protection and flood control equipment for the Omaha Civilian Defense Organization, Mr. Van de Water got pumping and other equipment to the central office promptly and, working day and night for several days, helped get the office back into service. Following this, he moved the equipment to a number of other business buildings where telephone company personnel helped him pump them out.

R. H. ROSS was at Eicor, Inc., Chicago, where he discussed dynamotors.

W. L. DAWSON was at the Patent Office in Richmond relative to patent matters.

THE LABORATORIES were represented in interference proceedings at the Patent Office in Richmond by G. C. LORD before the Board of Interference Examiners.

I. A. MCCORKENDALE appeared before the Board of Appeals at the Patent Office in Washington relative to an application for patent.

G. B. THOMAS, R. A. DELLER, R. J. HEFFNER, M. B. LONG, and E. W. WATERS attended the spring meeting of the Mid-Atlantic Section, Society for the Promotion of Engineering Education, held in Camden on May 6.

F. D. LEAMER has recently delivered a series of four lectures to a class on labor relations conducted under the auspices of the Engineering, Science and Management War Training Program at the University of Newark.

MISS M. C. BRAINARD, from May 1 to 3, visited five Pennsylvania schools—Bryn Mawr, the University of Pennsylvania, Drexel Institute, Temple University and Pennsylvania State College—to recruit college women for technical positions with the Laboratories. On May 4 and 5 she attended a conference, *War and Post-War Employment and Its Demands for Educational Adjustment*, held in Washington by the Institute of Women's Professional Relations.

DURING THE month of May, Mrs. E. D. Dodge visited high schools in the New York City area to recruit girls for messenger and mail clerk positions.

IN THE April issue of *The Review of Scientific Instruments* J. N. SHIVE reviews the book *Electronic Physics* by L. G. Hector, H. S. Lein and C. E. Scouter; W. A. SHEWHART, *Treatment of Experimental Data* by A. G. Worthing; and K. K. DARROW, *The Life of J. J. Thomson* by Lord Rayleigh.

"THE TELEPHONE HOUR"

(NBC, Monday Nights, 9:00 P.M., Eastern War Time)

JULY 3, 1944

Great Day — *Spiritual*
Chorus and Orchestra

Sylvia — *Speaks*

Ride, Cowboy, Ride — *Guion*

Ol' Man River from "Showboat" — *Kern*
Walter Cassel

An American in Paris — *Gershwin*
Orchestra

Service Songs—Medley
Walter Cassel, Chorus and Orchestra

JULY 10, 1944

In the Good Old Summertime — *Evans*
Orchestra

Liebestraum (No. 3—O Lieb) — *Liszt*

Spanish Dance in G Major — *Granados*
José Iturbi

Love Scene from "Romeo and Juliet" — *Berlioz*
Orchestra

Concerto No. 1, in B Flat Minor, Op. 23—Finale — *Tschaikowsky*
José Iturbi and Orchestra

JULY 17, 1944

Concerto in E Minor—First Movement — *Mendelssohn*
Fritz Kreisler and Orchestra

Overture to "The Marriage of Figaro" — *Mozart*
Orchestra

Tango in D — *Albeniz-Kreisler*

Caprice Viennois — *Kreisler*
Fritz Kreisler and Orchestra

JULY 24, 1944

Furiant from "The Bartered Bride" — *Smetana*
Orchestra

Amour! viens aider ma faiblesse from "Samson and Delilah" — *Saint-Saëns*
Gladys Swarthout

Beautiful Lady from "The Pink Lady" — *Caryll*
Orchestra

Flow Gently, Sweet Afton — *Traditional*
Gladys Swarthout and Male Chorus

Piper O'Dundee — *Trad.-arr. Respighi*
Gladys Swarthout

Dubinushka — *Rimsky-Korsakoff*
Orchestra and Male Chorus

L'Antoueno — *Trad.-arr. Canteloube*
Gladys Swarthout

JULY 31, 1944

Overture to Zampa — *Herold*
Orchestra

Sonata No. 14 in C Sharp Minor (Moonlight)—First Movement — *Beethoven*
Josef Hofmann

Concerto in E Major—Last Movement — *Chopin*
Josef Hofmann and Orchestra

Bell Laboratories' Club has no more tickets for these programs because its limited supply has already been distributed to applicants.

Women of the Laboratories

THOUSANDS of servicemen and civilian employees of the Armed Forces, stationed in all parts of the world, will remember MRS. ELLA ROHDE as their first and most personal contact with the Bell Telephone Laboratories School for War Training. She greets and registers the students on their entrance to the school and arranges for their release

ELLA ROHDE

on their final day, never for a moment bridging the relationship established throughout their stay at the school. Although her job is generally defined as associated with registration, distribution of text material and the checking in and out of classified documents, this is the mere beginning of her actual work for the school and for the students. As advisor to students on housing, recreation, city transportation facilities, etc., the situations have been rare that she has not been able to cope with. She has been carrying on this important war job with infinite patience and graciousness since the opening day of the school in April, 1942.

Mrs. Rohde is a native of Louisiana. She graduated from the Southwestern Institute of Louisiana with a B.A. degree, after which she taught school for a time before coming to New York and joining the A T & T. There, in the D & R, she had charge of a group of girls doing oscillogram analysis work. When the D & R was merged with the Bell Laboratories, she continued the same kind of work until the opening of the School for War Training.

At the present Mrs. Rohde's interests after hours are confined to her home and garden. Her leisure time, however, is exceedingly limited and, like the rest of us, she is looking forward to the end of the war when she will have more time for these and other avocations.

* * * * *

EDITH COFFIN was graduated from Roselle Park High School in 1935. Part of the fol-

EDITH COFFIN

lowing year she attended Drake Business School and then joined the Laboratories Transcription Department. For the past three years she has been doing secretarial work at Murray Hill. Edith is active in the Red Cross and Girl Scouts and likes bowling and the less strenuous diversion of needlework. Her summer vacations are usually spent down on the Jersey coast at Barnegat Bay where she can enjoy her favorite sport, swimming.

* * *

MABEL ROCHE

HER CORDIAL manner and pleasing appearance make MRS. MABEL ROCHE well suited for the position of receptionist at West Street. Her duties include seeing visitors who wish to be admitted to the building, issuing passes as required, and providing messenger escort.

Mrs. Roche was born in Evanston, Illinois, but spent a great part of her childhood traveling back and forth between Chicago and New York with her parents. At school she studied art with the intention of satisfying an early desire to become a fashion artist. However, in her first position as a receptionist she soon discovered that she preferred public contact work. Mrs. Roche then came to the Laboratories where she has been engaged in this work for two years.

With a husband and a home in Jackson Heights to take up much of her leisure time, Mrs. Roche has little opportunity for relaxation and hobbies. Nevertheless she does find time to search for records for her collection which includes recordings by Enrico Caruso and Harry Lauder, her favorites.

Shortage of stenotypists has prompted the starting of a training class at Murray Hill. It meets daily under the capable instruction of Muriel Cadmus (center). At the end of the third lesson all of the pupils were so enthusiastic about the course that they bought machines of their own and their progress has been most gratifying. From left to right are Corrine Marky, Charlotte Fischer, Peggy Anderson and Muriel Bey

JENNIE DAMIANI

FOR JENNIE DAMIANI doing precision measurement work in the laboratory, where measurements as fine as one ten-thousandths of an inch are made, is a striking contrast to her former work. A native New Yorker and a graduate of Hunter College, she had previously worked at Fort Monmouth, first on the installation of radios in Army trucks, jeeps and tanks and later on the building of transmitters, receivers and power supplies for research and development models. However, she enjoys her work in the Precision Measurement Laboratory far more than anything she has ever done. From all departments of the Laboratories war developments and communications materials are brought to be measured and tested. As a result she is constantly learning about new materials and new subject matter.

Miss Damiani has recently become the bride of her childhood sweetheart. Besides her scientific bent, she has athletic and domestic abilities. She enjoys all outdoor sports and excels in swimming; and she admits the ability to cook, sew, and do housekeeping. Non-fiction reading is her hobby, particularly philosophy.

* * * * *

IN THE SPECIFICATIONS distribution group of the Apparatus Development Department, MARY MCLOUGHLIN is one of a group of seven girls responsible for processing all specifications issued by the Department. Her part is the following through on drawings for the eight or nine thousand "specs" distributed in a year. Yet amid the excitement and the bustle of ordering, assembling and mailing them out—and nearly all are either rush or confidential—Mary not only manages to keep her sense of humor, but also to conserve enough energy to spare for her avocation, caring for the sick.

As a member of the Volunteer Hospital Association, one night a week she goes to the Beekman Street Hospital where, under the supervision of HELEN CORY of the Laboratories, she helps to prepare the patients for their night's rest. Later the harder work begins. It includes the sterilization of instruments and the cleaning up of the operating room.

Mary, upon graduation from the Girls'

Mary R. McLoughlin as a member of the Volunteer Hospital Association

High School in Brooklyn, became a member of the Laboratories' Blueprint Department where she worked for five years before transferring to her present position.

Write to Your Servicemen

Every one of us has at least one relative or friend in the service to whom we do or should write regularly and often. Not only the number, but also the kind of letters we write is important. An article in the June issue of *Vogue* offers some suggestions we might consider when we write:

"Never in all history were more letters to be shuttled across the earth. Letters today are making the difference between hope and despair. They have become the one tie between home and the fighter, and thus letters have become one of the most important single influences on the whole functioning of the war.

"The men who have the job of observing the spirit of fighting men—Army and Navy chaplains, personnel officers, Red Cross field directors—are much concerned about the kind of letters the men are receiving. From every front they report that they see good men give up under the strain of bad letters; see other men become heroes because the right letters keep on coming.

Write to your serviceman often.
Don't write about your troubles.
Write important news several times.
Counteract the scare rumor he may be hearing.
Address correctly. (The Post Office has 3,000,000 mistakes a week.)
Use enough stamps.
Remember, love is uncensored!

"There are letters from the self-pitying loved ones who think of nothing but themselves. They undermine a man's attempt at adjustments. The families shouldn't write to the men of things about which the men can do nothing.

"An entertainer on tour in Australia spoke of men 'packed twenty at a time in foxholes built for four,' receiving letters complaining about crowded wartime trolleys.

"When there is really bad news, the man must, of course, be told. No man wants to feel he is being 'protected' from things he should know. The art is to keep the man from being shocked, and yet keep him assured that he is not being 'shielded.'

"To someone really close, one should write every thought, every detail of daily life. One should transport the life at home to him as clearly as words make it possible, for he wants so much to live that life vicariously.

"No man wants a lot of phoney letters filled with forced good cheer. They should be filled with honest hope for the future, pride in that job he is doing, and faith in why he is doing it."

Engagements

*Jack Maisel—Edith Tarnover
*Harold A. Sweet, Jr.—Carol Henry
*Lt. Richard C. Benkert, U. S. Army—*Marjorie Flynn
William T. Parsons, U. S. Army—*Phyllis-Jane Vibbard
John H. Eick, U. S. Army—*Marie Teschner
George W. Trenchard, U. S. Navy—*Mildred Paul

Weddings

*Charles S. Graham, U. S. Army—Connie Pascal
*Roland M. Scheller, U. S. Army—*Edith Jacobs
T. D. Bergowsky, U. S. Army—*Freda Schwartz
Manny Gelburd, U. S. Army—*Harriet Spiro
*Robert L. Slobod—Jeanne Lamar
Frederick Berwind, U. S. Army—*Lucille Anderson

*Members of the Laboratories. Notices of engagements and weddings should be given to Miss Mary Ellen Wertz, Room 1103, Extension 296.

$12,557 Contributed to Greater New York Fund

As of June 21, 4,173 members of the Laboratories, or 74.3 per cent of those working at New York City locations, had contributed $12,557.66 to the annual Greater New York Fund. Of this amount 374 persons gave $1,929.00 on the Payroll Deduction Plan. The participation compares with 74.8 per cent in 1940, 82 per cent in 1941, 87.7 per cent in 1942 and 50 per cent last year. The amount subscribed was larger than for any of the previous years.

The actual campaign extended from May 23 to June 3 and was sponsored by the Executive Committee of the Bell Laboratories Club with G. B. Thomas acting as Campaign Chairman. Much of the credit for the success of the Drive was due to the splendid coöperation of the 260 club members who solicited all members of the Laboratories in New York.

Retirements

CLARENCE H. BERRY of the Switching Development Department, with over forty years of service, retired under the Retirement Age Rule with a Class A pension on June 30. After graduating from Pratt Institute in 1899 he worked for three years with the Suffolk Gas & Electric Company on Long Island and then joined the New York Telephone Company. For seven years he served as wireman, inspector, tester and foreman of switchboard installations. He left the company in 1909 and spent a year with the Radio Telephone and Telegraph Company under Lee DeForest as draftsman and designer.

In 1910 Mr. Berry joined the Western Electric Company in New York City and for four years was inspecting and testing central-office installations, first in metropolitan New York and later in the territory of the Southwestern Bell Telephone Company. He then transferred to the New York headquarters of the Central Office Inspection Department, and finally became Division Inspector in the New York Telephone Company's territory, covering New York State, Long Island and part of New Jersey. In 1919 he came to the Laboratories where he has since been engaged in the design, development and analyzation of circuits for dial and manual systems.

* * * * *

MRS. BESSIE M. GIFFHORN, secretary to O. B. BLACKWELL, Vice-President, retired at her own request with a Class A pension on June 9. Mrs. Giffhorn was with the American Telephone and Telegraph Company from 1915 to 1919 and for a short time in 1921. Five years later she returned to that organization as a member of the Department of Development and Research and came to the Laboratories at the time of the 1934 consolidation.

Packaged Central-Office Equipment Given Dramatic Test

Five U. S. Army transport planes roared down the runways of Atlanta's Candler Field recently and winged their way westward with eleven tons of packaged central-office equipment. Fire and water had wrecked the telephone office at Camp Van Dorn, at Centreville, Miss., and the planes' cargo of a 1,000-line manual switchboard and toll line relays, in 150 packages, was

This "Self-Service Egg Layer" was presented to C. H. Berry by his associates in Systems Development at the time he retired. It was designed and built by L. E. Van Damme of the Switching Development Department

Packaged central-office equipment is loaded on one of the five Army transport planes which carried the emergency war stock on the first leg of its journey to Camp Van Dorn in Mississippi, to replace a central office damaged by fire

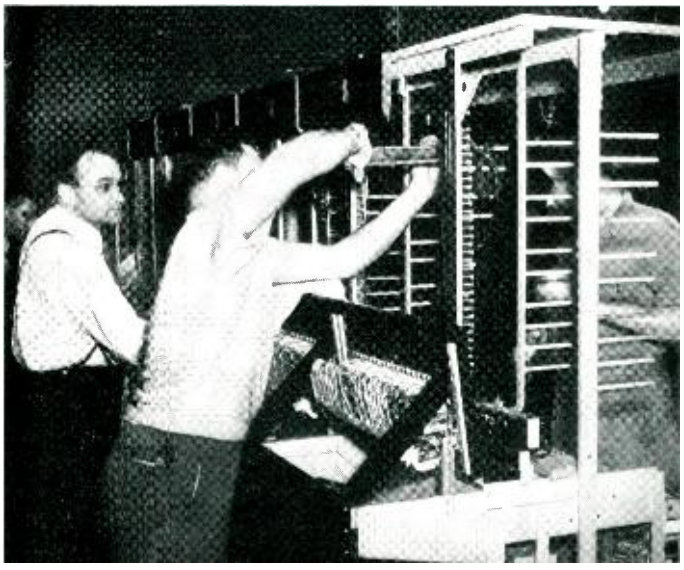
the first consignment of the American Telephone and Telegraph Company's war emergency stocks to be used for replacing a damaged telephone office.

That telephone service for the big Army camp was fully restored in nine days reflects credit not only on the teamwork of the Army Air Forces, the Signal Corps, Southern Bell Telephone Company and the Western Electric Company but also on the Bell System people who conceived and carried out the plan for storing pre-engineered and packaged equipment at strategic locations throughout the country as insurance against enemy action or other war-born emergencies.

The manual packaged unit* sent to Camp Van Dorn had been designed to be installed intact as a complete tailor-made job, and as such could be set up and in operation within three days. But since this central office combines manual, dial and toll equipment, the packaged unit had to be greatly adapted. In view of this, completion of the installation in nine days stands as a remarkable achievement.

The transport planes took the equipment from Atlanta to Baton Rouge, La., where it was quickly transferred to a convoy of Army trucks and sent on to Camp Van Dorn. Some of the toll equipment had to be ordered from several of Western's plants and distributing houses. The assembling, wiring and testing of this equipment was done on the job.

Manpower for the job at Van Dorn came from all points of the compass. Twenty-eight Western Electric installers arrived the first day from Baton Rouge, New Orleans and Jackson, Miss. Additional Southern Bell people came by air and railroad. Most dramatic, however, was the arrival of an Army signal company, which was on a field problem fifty miles away at the time of the fire. The



Packaged switchboard being installed at Camp Van Dorn

*RECORD, *March*, 1944, *p.* 336.

Group of Bell System General Plant Managers viewing Spiral-4 equipment at Murray Hill

signal troops worked hard under pressure and made a real contribution to the job.

On the night of the fire, a call from the senior switchman at Van Dorn, transmitted over a makeshift circuit, set the wheels in motion for service restoration. Key telephone men at Jackson were called together at midnight; they notified others at company headquarters in Atlanta.

Speed was the keynote of the whole operation. Telephone people worked side by side with Army men. Some of them went for days without sleep. During an early stage of the job, Army emergency service was maintained by connecting Army magneto sets with a 16-pair telephone company cable. In addition, the Signal Corps set up two positions of Army magneto switchboards across the street, and placed field telephones at strategic locations.

At two of the camp's attended locations magneto service was arranged on an emergency basis during the restoration period. The trunks were connected between the Army switchboards in the fire station and the central office. Power was provided by a partial salvage of batteries from the office and by automobile-type batteries.

Bell System Plant Managers Visit Murray Hill

Sixty general plant managers of the Bell Telephone System visited the Laboratories at Murray Hill May 26 on the final day of their conference in New York. They viewed displays of war developments, including airborne and tank radios, military telephones, quartz crystals, Spiral-4 and package toll and carrier and a portable information center. These were demonstrated by R. L. Case, J. A. Coy, F. E. Wollensack, W. C. Jones, W. P. Mason and J. R. Erickson. A demonstration of dialing speed was given by L. J. Stacy. C. F. Seibel discussed automatic ticketing developments. The visitors were shown the special construction features of the buildings and the rubber and metallurgical laboratories by F. P. Gilliland, A. R. Kemp, E. E. Schumacher, R. L. Towne and G. W. Lees, Jr.

Our Service Flag

The blue numbers on the Laboratories' service flag gave an upward jump on June 1 not solely based on those left who for service the preceding month. Formerly the net number on military leaves of absence was

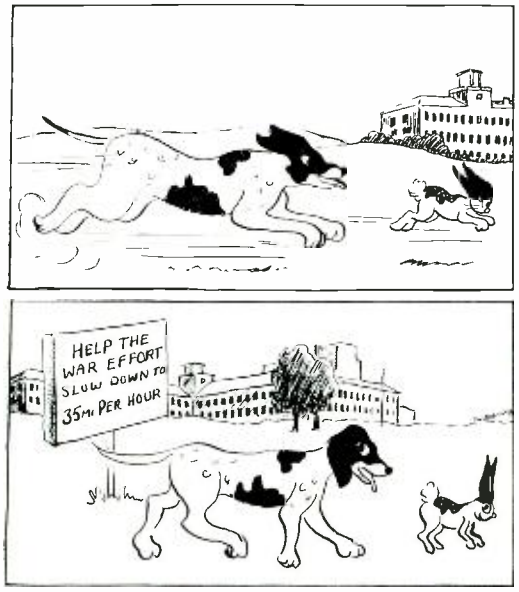
shown. This practice has been in accordance with the strictly literal interpretation of the War Department's regulations concerning service flags, but the A T & T was advised by it recently that either such a net figure or the total number of all employees who have been in the armed forces during the current war would be entirely satisfactory.

Since, therefore, continued use of the net figure might soon result in a diminishing total as the number of new entrants decreases and the number of men returning increases, the A T & T thought it desirable to include in the total shown on the flag all those who were serving with the armed forces at the time of Pearl Harbor plus all those who have served since that time. Upon being advised of the findings of the A T & T and their action, the Laboratories acted to change its flag accordingly. As of May 31, 846 members of the Laboratories have been on military leaves of absence of which 33 leaves have been completed and 813 were still active.

Transportation Still Critical

In spite of optimistic news headlines on gasoline, always remember that the automobile transportation chain has more than one link. A tank of precious gasoline may be "only a fire hazard" in a car that is out of service. Tires and car repair service are at present on the shortage list. Reports from many Local Ration Boards still show tire requests more than double the size of their tire quotas, and car repairs in many cases must be scheduled days ahead.

Until the good old days return when you can say "fill 'er up," the safest way to keep them rolling is to drive slowly, take care of your car, and share rides when you can.



Watch That Sunburn!

"Get your sun tan gradually—a few minutes a day to start." We hear it every summer when we start thinking about a nice golden tan. But with only one day a week in which to soak up our quota of Vitamin D on the beach or in our Victory gardens, we find it difficult to remember that several hours the first day in the sun will result in several days and nights of misery.

Those who take their sun at the shore should remember that alternate bathing and baking result in even more serious reactions. Headache and nausea are among the symptoms. These burns are painful and cause sleeplessness, stiff muscles and large blisters. Disability may last a week or more.

So, when you are out in the open protect your skin as much as possible. No matter how painful, a "brilliant" case of sunburn never excites sympathy, but instead merely, "You should have known better!"

Red Cross Campaign Results

Contributions to the New York City campaign of the 1944 Red Cross War Fund by the various communication companies and their employees totaled $518,977, 34 per cent more than last year. Corporate gifts, which were $387,270, exceeded last

Red Cross Blood Donors

year's figure by 33 per cent and employee contributions, which amounted to $131,707, represent an increase of 37 per cent over last year. Employees contributed an additional $50,400 which they requested be credited to chapters outside New York City.

The Laboratories was third in individual contributions with a total of $23,159 and second in the average amount of pledge, $6.31 per contributor.

M. E. Brandin*	R. P. Luttkus
Adele Brooks	L. D. Mann
Gertrude Brown	R. Olsen
J. G. Compagnoni (2)	Walter Pearce (2)
J. J. Halligan	D. B. Penick*
A. C. Holetz*	George Seidel (5)
Constance Kaval (2)	H. T. Sorensen (2)
G. T. Loman	W. D. Stratton
J. W. West (3)	

*Members of the Gallon Club.

"A T & T on Tarawa"

The Marine communications post on Tarawa Island brought poignant memories to S/Sgt. Jack Brooks, a former member of the Western Electric Company from the St. Louis district, when he saw the photograph which is reproduced below.

"I set up the first switchboard in that pillbox," he wrote from the Southwest Pacific. "In fact, as far as I can gather, it was the first board to be set up on the island. It wasn't a good idea to sit out in the open like those guys are doing (in the picture). The sign saying there are Nips buried there is quite correct. The exact number was four, 'cause we cleaned out that pillbox and buried them ourselves."

While working on that switchboard, the Sergeant said, his buddy was killed and his own tools, for which he had paid $20 in New Zealand, were ruined.

When the U. S. Marines set up business on Tarawa, they named their communications headquarters as shown above

Manufacture of Telephone Sets to Be Resumed

Manufacture by the Western Electric Company of telephone sets for civilian purposes, which was interrupted due to war restrictions in November, 1942, is to be resumed to a limited extent, with deliveries expected to begin late this year. Western Electric, which has been authorized by the War Production Board to supply approximately eighty per cent of a projected 200,000 telephones per quarter, has announced acquisition of a factory for that purpose in St. Paul, Minn.

That resumption of manufacture of 200,000 telephones every three months will not solve the present set shortage was made amply clear by Leighton H. Peebles, director of WPB's Communication Division, who warned that authorized production will not for some time approach essential demand.

The Pacific Coast, where military and associated civilian requirements are urgent, will receive the first of the sets. After that, the newly produced instruments will be assigned to areas most needing them.

Obituaries

CHARLES P. KOHLER, a night watchman in the Building Service Department, was killed in the performance of his duties as a registered Air Raid Warden during the state-authorized test blackout on the night of May 24. Mr. Kohler was last seen entering the Baker-Williams building to assume his assigned post as a fire-watcher on the roof. At the conclusion of the blackout he did not return to his regular duties in the West Street building and in the investigation which followed it was found that he had been killed in a fall down an elevator shaft in the Baker-Williams building.

C. P. KOHLER
1909-1944

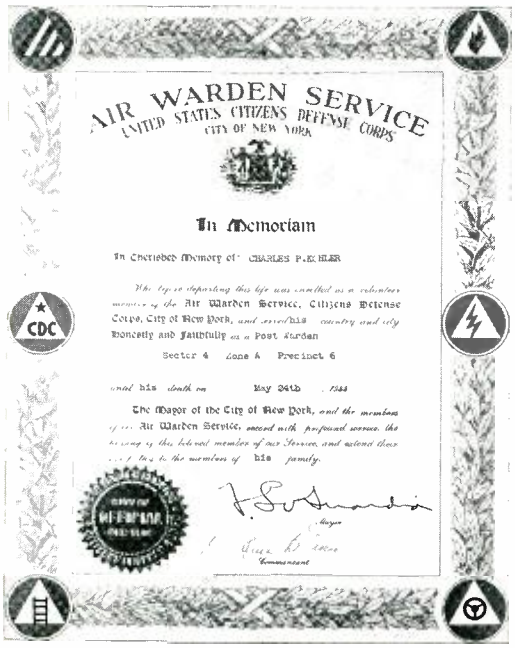
W. J. SULLIVAN
1898-1944

Dr. Buckley, in his letter to Mrs. Kohler, has aptly expressed the sentiments of the Laboratories with these words ". . . I want you to know that we feel Mr. Kohler died in the performance of his duty as a good citizen and in the service of his country. . . ."

Mr. Kohler joined the Laboratories in 1936 as a night cleaner and became a night watchman in 1942.

* * * * *

WILLIAM J. SULLIVAN, a staff assistant in the Apparatus Development Department with continuous service in the Bell System since 1922, died on May 31. Mr. Sullivan served in World War I from April, 1917, to April, 1919, most of the time in France with the 106th Machine Gun Battalion of the 27th Division. Before joining the Installation Department of the Western Electric Company in 1922 he spent a year at New York University and later took evening courses at Fordham University. Mr. Sullivan transferred to what is now the budget and case cost group of the Apparatus Staff Department in 1924. Here his work was principally concerned with budget statistics, plant expenditures and general cost accounting on apparatus development projects.



EMMA L. WAY, secretary to H. M. BASCOM, Director of Switching Engineering, died on May 22. Soon after graduating from the Paine Business School, Miss Way become a stenographer and from then until 1920 was successively with the Maryland Casualty Company, Johnson and Higgins and the Aetna Insurance Company. She joined the Engineering Department of the A T & T in 1920 and later that year transferred to the O & E and two years later to the D & R. Miss Way came to West Street when the D & R was consolidated with the Laboratories in 1934.

Armed Forces Standardize Radio Tubes

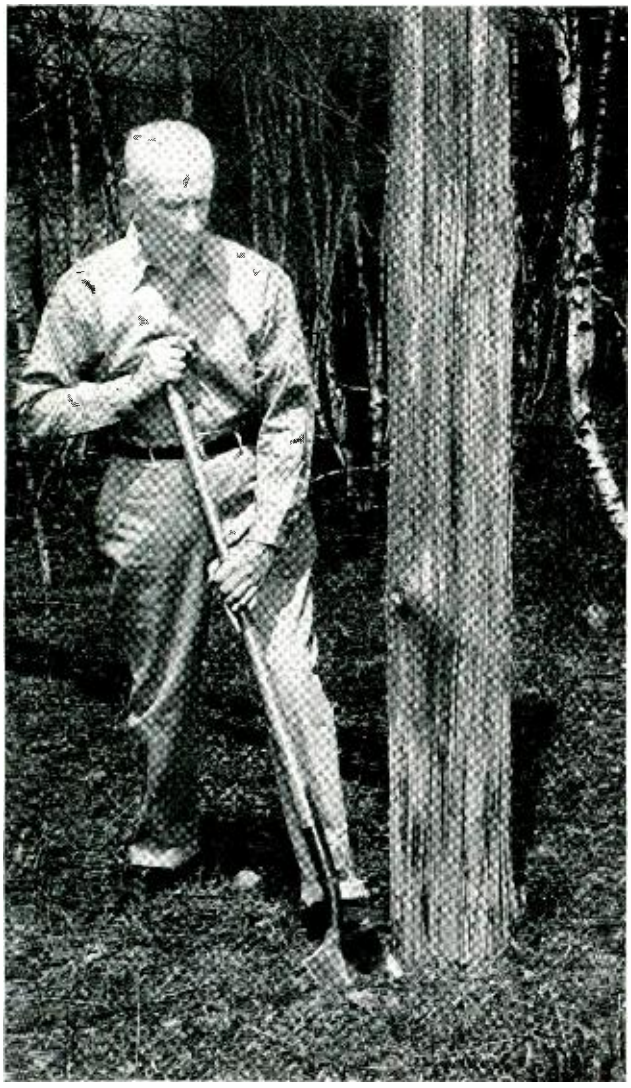
Substantial economies in time, manpower and money have been effected through the recent standardization of radio tubes used by the Army, Navy and the Canadian armed services. Among the more important results of the standardization has been easier interchangeability of tubes, common stockpiles, elimination of dual inspections at the manufacturers' plants, and use of standard nomenclature.

Before Pearl Harbor the Army and Navy each had its own system of tube nomenclature which was, in many cases, unrelated to that of the Radio Manufacturers' Association and other commercial type numbers. Early in 1942 work was begun to prepare a Joint Army-Navy Specification for tubes to be based on the use of RMA and commercial type numbers. The work was done by a committee of Army and Navy representatives, assisted by representatives from industry. Among the latter were J. R. WILSON, director of electronics research, and most of the engineers of his staff. Among them were V. L. RONCI, A. I. CRAWFORD, J. O. MCNALLY, S. B. INGRAM, G. T. FORD, M. S. GLASS, A. L. SAMUEL, J. B. FISK, H. E. MENDENHALL, and C. E. FAY. H. F. DODGE of Quality Assurance also participated. Many of the committee's meetings were held at the Laboratories. This specification has now been authorized by a Joint Army-Navy Committee and the Canadian armed services have also adopted it.

After the transition stage, during which existing tube stocks will be used up, all tubes purchased and stocked by the organizations just named will be fully interchangeable. This one factor alone is of tremendous importance in the field, where replacements are needed in a hurry. Army tubes will now work in Navy equipment and vice versa, without loss of valuable time.

Furthermore, by pooling their requirements, the Army and Navy have been able to improve the quality of the tubes. The manufacturer no longer is obliged to make the same tube meet two slightly different specifications, with the result that he can now concentrate on making that tube better. Already reports have been received from fighting fronts telling of the superior characteristics and quality of these tubes.

Electronic units for field use, like this BC-454-B *radio receiver for radio command in airplanes, must be designed to take into account the normal tolerance variations in electron tubes. These standard tolerances are set forth in Joint Army-Navy Specifications* JAN-1A *for Radio Electron Tubes*



Ground Line Treatment of Standing Poles

By C. H. AMADON
Outside Plant Development

OF THE many millions of telephone poles in the United States, all but about one million have been treated with toxic compound for protection against attack by wood-destroying fungi and insects. The one million are the surviving untreated chestnut and northern white cedar poles which are relatively resistant against attack. At the time they were placed, it was the general practice to set poles sufficiently oversize to provide a safe margin of strength during their service life and to replace them with new ones when deterioration at and just below the ground level had so reduced their size that they were no longer strong enough to sustain wire and storm loads.

External deterioration of an untreated pole in service begins in the ground section with infection by wood-destroying fungi which are almost universally present in one form or another in the soil and in the air. Once established in a pole the destructive organism will continue there unless conditions adverse to it are established, for example, by the application of a suitable wood preservative.

About eight years ago interest revived in providing means of prolonging the life of untreated cedar and chestnut poles in service. The Laboratories, therefore, laid out a program to develop a low cost but effective preservative treatment which could be applied to the vulnerable section of the poles, that is, from a few inches above to some twelve to fifteen inches below the ground line.

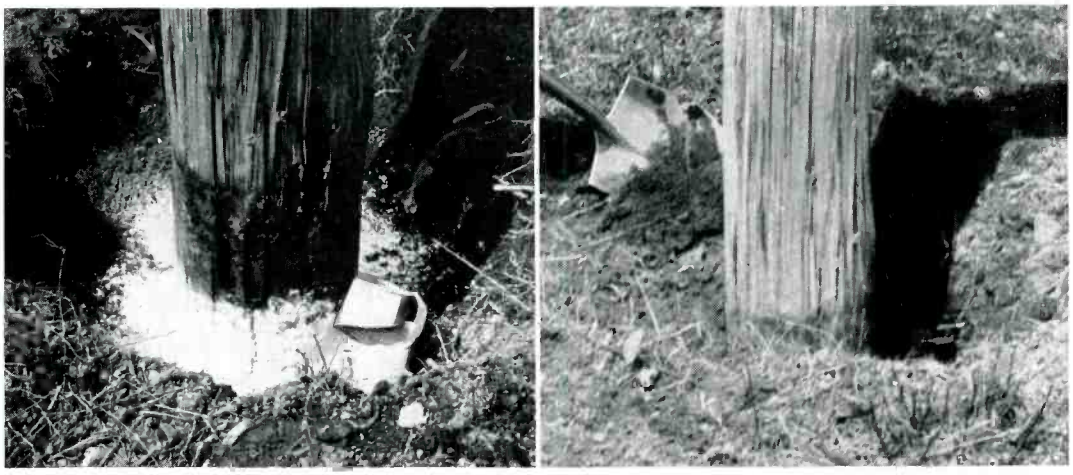
There are two general classes of preservatives that might be used for ground line treatment, namely, oily materials such as creosote; and water solutions of toxic salts, for example, zinc choride and sodium fluoride. Sodium fluoride appears to be particularly good for penetrating the heartwood of cedar and chestnut timbers but it is not permanent. On the other hand, creosote or a combination of creosote and coal tar, although not as penetrating as the water soluble salt, is about as lasting as any preservative known. The characteristics of the two types of materials suggested using both of them at the same time.

Beginning in 1935, Laboratories engineers, with the coöperation of interested departments of several of the Associated Companies, treated experimentally a total of

428 poles and posts. The preservatives used included coal-tar creosote and other coal tar products, sodium fluoride, sodium silicofluoride, and proprietary pastes and solutions containing preservative compounds.

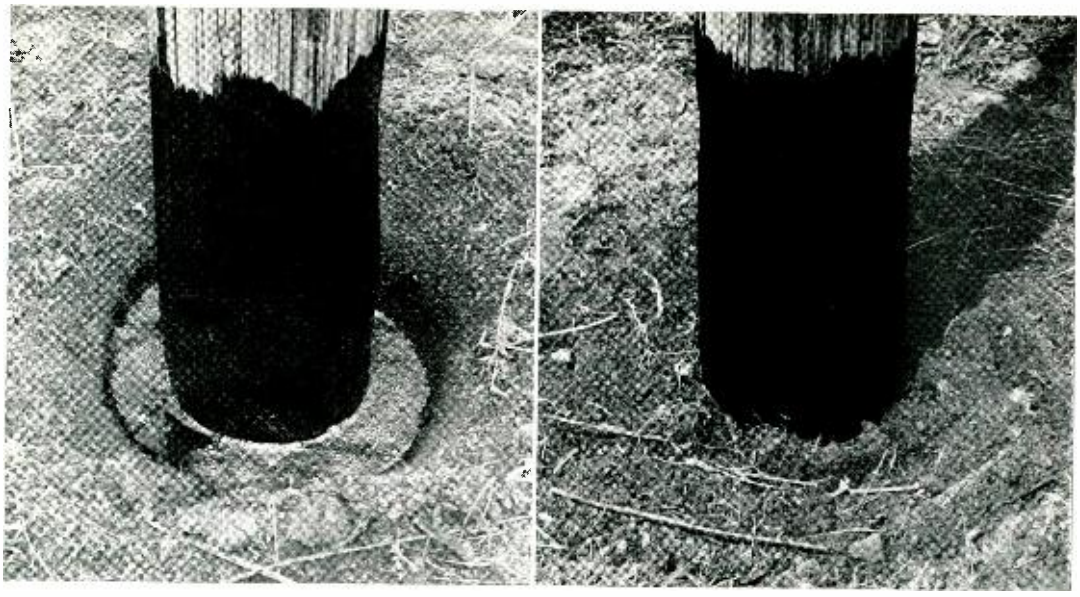
Periodic examinations and accumulated evidence during five years showed that treatment at the ground line with sodium fluoride* and a mixture of creosote and coal tar is highly effective. This treatment is now recommended Bell System practice for untreated poles, provided they are good enough to remain in service until the next inspection, usually three years later. The first step is to distribute one pound of sodium fluoride against and around the pole at the bottom of the excavation, which has been opened for inspection purposes. The excavation is then filled loosely with soil to the

*Sodium silicofluoride is being substituted for sodium fluoride because of wartime restrictions on the latter material.



Excavating around the butt of a telephone pole for ground line inspection and treatment with preservatives is shown at the head of this article. A pound of sodium fluoride is distributed against the exposed butt and in the bottom of the excavation, above left. The empty container is buried with the preservative. The excavation is filled loosely to the ground level to cover the sodium fluoride as shown at the right

A narrow trough is formed around the pole by pressing the loose soil away with the shovel to a depth of about ten inches. From a gallon to a gallon and a half of creosote is poured against the pole from a can which has a flattened spout to give a fan-shaped stream



A pool of creosote surrounds the pole and saturates the soil. After a short interval the creosote-saturated soil is pressed against the pole and back filling is completed

ground level and a trough is formed around the pole by pressing the soil away from it to a depth of about ten inches. Using a convenient container like an ordinary watering can, with the sprinkler head removed and the tip of the pouring spout flattened to pour a fan-shaped stream, from one to one and a half gallons of creosote is poured against and around the pole at a height of about eighteen inches above the ground level. Care is taken that the creosote enters any large checks in the pole surface. After a short interval the creosote-saturated soil is pressed against the pole, and back filling is completed. If the pole stands where creosote would not be objectionable on the surface of the soil, another shallow trough is formed around the pole and about one-half gallon of creosote is poured against it as before. This last application provides a collar of creosote-saturated soil immediately surrounding the pole from the surface of the ground down to the depth of the original trough. Where poles stand in parked or grassed areas, the final application is omitted. This ground line treatment has been adopted by several of the operating companies, one of which, in Canada, has already treated about 258,000 northern white cedar poles out of some 450,000 remaining in its lines.

Accumulated evidence from experimental and operational treatments indicates that the sodium fluoride and creosote treatment effectively reduces the rate of deterioration of poles in line and that their service life,

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THE AUTHOR: C. H. AMADON graduated from the Biltmore Forest School in 1908 and then continued in the practice of forest engineering until he joined the Engineering Department of the Western Electric Company in 1917. Since then he has been engaged in establishing standard inspection procedures and supervising inspectors of the timber products used in outside telephone plant.

This work was carried in on the Inspection Engineering Department until 1927 when it was transferred to the newly organized Outside Plant Development Department. Since that time, as a member of the timber products group, Mr. Amadon has had a responsible part in setting standards for timber products and in the development of improved processes for the preservation of wood.

as far as ground line condition is concerned, will be increased by about six years. This extension of pole life is alone considered sufficient to justify the costs involved, but an additional saving accrues from the possibility of placing pole line inspection on a six instead of the three-year cycle, which has been the usual practice with untreated poles. The cumulative result of the ground line treatment is a reduction in labor and expense of pole line maintenance-inspection and in the need for new poles at a time when conservation of pole timber, labor and transportation are all important.

Laboratories Development Helps Raiders

June 15 was a big day for a number of people in the Laboratories, when word was passed around that B-29 planes of the 20th Bomber Command had raided Japan. That public announcement marked the culmination of an effort in Bell Telephone Laboratories which began in August of last year. The Laboratories was asked to undertake the design and start the production of certain electrical apparatus for use on the new ships. Electrical design was assigned to High Frequency Engineering, headed by J. F. Wentz; equipment and mechanical design for manufacture to the group of equipment engineers headed by A. D. Knowlton. To R. H. Kreider's group in Trial Installation was given the production of a small number of units while Western Electric was organizing for large-scale production. By dint of hard work, aided by close coöperation from the Air Force, the Laboratories quota was filled around the first of the year. Part of the job was to train ten Air Force officers in the operation and maintenance of the equipment.

High Frequency Engineering was formerly engaged in coaxial cable development. Early in 1941 it took up its first war project, and now is completely immersed in that work. It works closely with a group of equipment engineers who normally handled carrier and transmission systems. Trial Installation, once concerned with building and installing trial installations of telephone systems, made use of the skill and versatility of Western Electric installers which makes them ideal for building small numbers of new devices.

Metallurgy of Wiped Solder Joints

By G. S. PHIPPS
Chemical Laboratories

FOR many years cable splicers have joined lead cable-sheath by a soldering process called "wiping." The name is an apt description of the operation. Molten solder is poured over the sections to be united until they are heated and thoroughly tinned. Then the semi-liquid mass which immediately begins to form is manipulated by wiping with cloth pads into a well-rounded symmetrical joint. This requires considerable skill on the part of the splicer and close control of the composition of the solder. Experience shows that even under the best conditions fissures occasionally form a path in the solder through which leakage occurs. In telephone cables, not maintained under gas pressure, these leaks may permit the entrance of water which, wetting the paper insulation, causes service interruptions.

By going to the extreme of wiping off all of the solder in excess of a fillet, many causes of porosity can be eliminated. The saving in solder, and consequently in strategic tin, by this operation is evident from Figure 2 which shows cross-sections of joints wiped by both methods. Over sixty per cent less solder is required by the new joint and splicers find it easier to make.

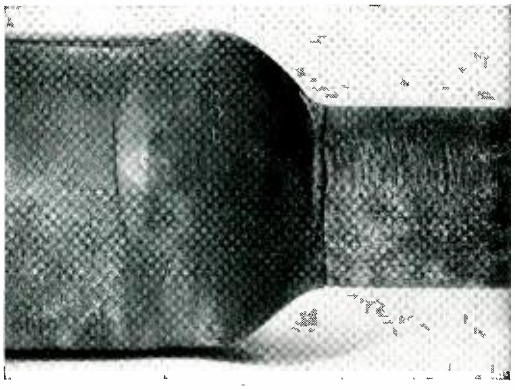

Fig. 1—This conventional joint between a telephone cable and sleeve requires a large amount of solder

The success of the new method depends on the characteristic behavior of lead-tin alloys in the process of freezing. When molten metal is allowed to cool in a crucible with free circulation of air it begins to freeze near the walls of the vessel and, with a few exceptions, ends with a concave surface due to solidification shrinkage. When a lead-tin alloy solidifies, the first constituents to crystallize form a rather porous cylinder which touches the crucible walls and extends to a height corresponding to the volume of the melt. On further cooling, tree-like formations of lead-tin, called dendrites, grow inward toward the center of the crucible and at the same time many tiny new crystals form throughout the liquid. There are thus taking place simultaneously, shrinkage of metal as it becomes solid, shrinkage as it cools of the part previously frozen and shrinkage of the remaining liquid as the temperature drops. The originally solidified outer cylinder, adhering to the crucible walls, remains essentially at its original height. The level of the semi-liquid portion nearer the center of the crucible continuously falls until the precipitated crystallites, formed in the body of the melt, make a loosely piled mass extending from the bottom to the upper surface of the crucible. Further shrinkage of the liquid then leaves these primary crystallites at approximately this level while the liquid recedes, leaving fissures between them.

Insight into the solidification mechanism of wiping solder may be gained by casting two solder strips, one on a cold iron surface, and the other on a cloth-covered board and bending both to produce specimens as shown in Figure 3. The sample chilled by the iron will exhibit fewer cracks from shrinkage than the one slowly cooled on cloth. Primary crystallites form throughout the slowly solidifying mass and pack loosely to occupy a volume which is greater than that of the

completely solid solder. The sample cast on the cold plate starts to freeze where it is in contact with the cold iron and it continues to solidify in a rapidly advancing smooth front until the last liquid at the top is solid. There is little opportunity for nucleation, i.e., crystals spreading from point sources, and for dendrite formation in the upper liquid

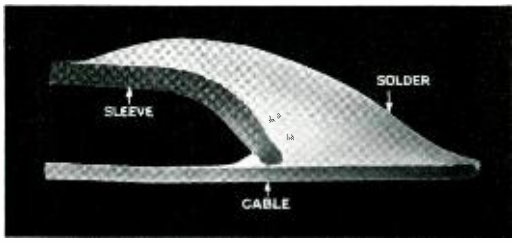

Fig. 2A—*Section of a cable joint like that shown in Figure* 1

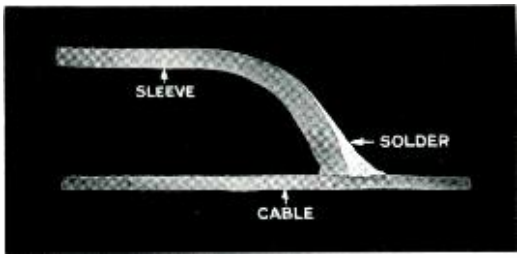

Fig. 2B—*Section of a cable joint using the new fillet technique of the "Victory Joint" which saves more than two-thirds of the solder formerly used*

because of the steep temperature gradient. The surface of this melt is therefore smooth and free from the fissures which are caused in the slowly cooled sample by the shrinking of the liquid solder away from the dendrites. This shrinking leaves a multitude of channels which would cause leaks in a wiped joint if they occurred at the critical point.

Another illustration of the processes taking place in joint wiping is the behavior of solder which has been allowed to solidify in a crucible until its surface is quite firm to a probe. When tilted sideways to a position shown in Figure 4 a portion of the remaining liquid may be poured out leaving spongy regions in the solder. This loss of eutectic, i.e., the constituent of lowest solidifying point, is observed frequently while shaping the former massive joints from which several drops sometimes drain after the splicer has completed the shaping operation. It is also shown by the greater number of pores in the top half of a joint compared with the bottom and by the grayer surface appearance of the top.

Although a solidification range in which quantities of liquid and solid metal may exist at equilibrium is an essential feature of a wiping solder, another factor of major importance is the nucleation rate of the alloy. Wiping solders having high nucleation rates develop quickly a myriad of points or nuclei throughout the melt from which further crystallization proceeds. An alloy of low nucleation rate, however, develops relatively few of these points in the same time and consequently grows fewer and larger crystals. When subjected to wiping the former has a texture similar to fine clay while the latter behaves like coarse sand and water. In the fine clay-like texture there are more solid particles than in the water-sand type and therefore more surface is available for the retention of the liquid in the semi-solid mass. Drainage is thus greatly

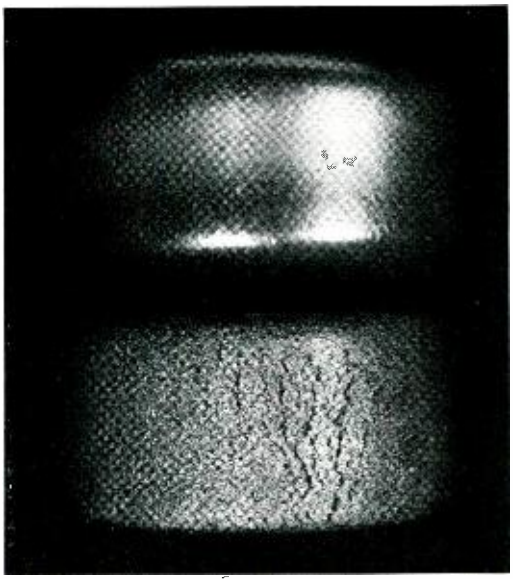

Fig. 3—*Strips of solder bent over a rod one-half inch in diameter to illustrate the effect of variations in the cooling rate on the structure of wiping solders. The upper strip was chill cast and shows a sound ductile surface. The lower one of the same solder was cooled slowly and on bending exposed fissures between the crystallites at the surface*

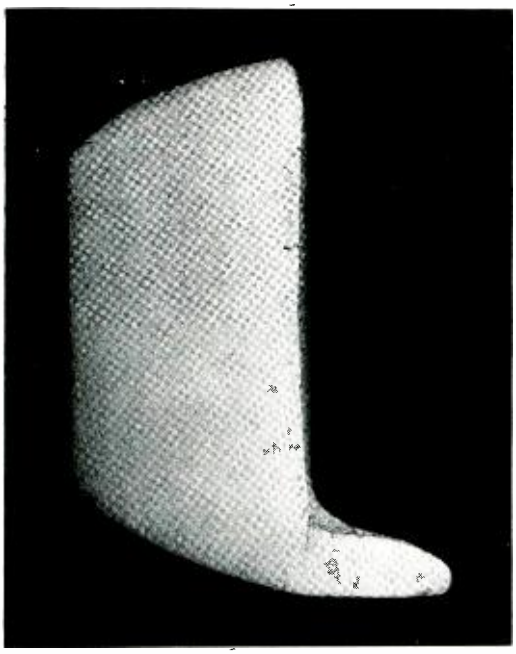

Fig. 4—An ingot of wiping solder which was tilted while in the crucible before becoming completely solidified. The lower lip is eutectic drainage from the partially solidified mass

retarded with the result that porosity is materially lessened. Texture determines in a large measure the ease of shaping and the potential porosity of a wiping solder.

In practice, the cable parts to be joined are cleaned and fluxed. Paper pasters are then applied around the sheath and sleeve to restrict the spread of the solder which is poured from a ladle over the prepared parts. The splicer catches the excess in a cloth held in contact with the bottom of the joint and repeatedly pushes it back around the cable with a wiping motion to aid "tinning" or alloying and to distribute the heat. After a few such operations the prepared surfaces become thoroughly wetted by the solder.

At this stage a portion of the caught solder is mixed in the ladle with more hot solder and the mass, which now has a clay-like consistency, is poured on the joint and molded into place with cloth pads. When solidification has proceeded until the solder can support itself, manipulation is stopped. From this point on, loss of heat takes place by conduction from the joint through the sheath and sleeve, by radiation, and by air convection currents at the surface of the solder. As a result of these heat losses, solidification occurs finally in the interior of the mass near the important sheath-sleeve junction.

The action that causes pipes to form in castings draws the eutectic from the critical area between the sheath and the end of the sleeve. If the solder has the proper characteristics there will be an outside layer which does not have interconnecting shrinkage cavities, drainage cavities or fissures due to the wiping operation; and the finished joints will be gas tight. If the solder is unduly coarse, however, or has insufficient liquid eutectic at the time the mass becomes too rigid to manipulate further, the joints may leak.

The technique of fillet wiping is similar to the former procedure until the splicer shapes the mass. At this point he wipes the solder to a small fillet similar to that shown in Figure 2. The joint thus formed takes much less solder and therefore has less tendency to shrink and to draw eutectic from the space between the sheath and sleeve. At the temperature at which wiping is discontinued there is also insufficient solder left to permit drainage drops to accumulate and fall from the bottom of the joint. Thermal conduction along sheath and sleeve causes rapid solidification of the solder at the joint, thus eliminating the possibility of drainage. Experience has shown a consistently high percentage of sound joints when fillet wiping is rigidly practiced. During the development period of this process the few fillet joints that leaked were found to have been made with an excess of solder. Under the microscope they showed sponginess where the eutectic had been drawn away from the junction during solidification.

Physical tests on fillet joints between sections of a telephone cable and its sleeve, which are similar in size to that shown in Figure 2b, have demonstrated that these joints are stronger in tensile strength and show less creep and fatigue than the cable sheath itself. The composition of the solder used was 38 per cent tin, 0.1 per cent arsenic and the balance lead.

Application of the new technique has gone much further toward saving tin than any known permissible change in the composition of wiping solder. Using the former

technique, a reduction of only one per cent in the nominal tin content of a lead-tin solder caused leaky joints which indicated that little tin could be saved by a simple change in specification. This was expected because many studies had been conducted by the Laboratories with the aim of reducing the tin content in wiping solders to the minimum consistent with the production of satisfactory joints. Tin has always been much more expensive than lead and for large users of solder a reduction of even one per cent in the tin content would result in substantial savings.

Other avenues for conserving this strategic metal are the substitution of ternary and quaternary alloys containing less tin than that required by the binary lead-tin solders. A satisfactory alloy of this type which contains 13 per cent tin, 23 per cent bismuth, 0.1 per cent arsenic and the balance lead has been developed by the Laboratories. Though readily obtainable a short time ago, bismuth is now unavailable for solders. A new wiping solder, however, has been introduced into service. Its tin content is reduced to 32 per cent and it contains, in addition to lead, 2 per cent antimony and 0.1 per cent arsenic. This material appears suitable for fillet wiping although it requires more skill in use than wiping solder made of 38 per cent tin and 0.1 per cent arsenic with the balance lead. Other compositions which contain less than the normal amount of tin may be usable but, on the whole, the savings accomplished by composition changes would be small compared to those which have been obtained by the new wiping technique.

The small amount of solder required for the fillet wipe not only reduces tin consumption but it produces joints less liable to leakage than the conventional type. This success is based on sound metallurgical principles and promises to survive the period of restricted tin consumption.

THE AUTHOR: G. S. PHIPPS received a B.S. degree in Electrochemical Engineering at Pennsylvania State College in 1930 and an M.S. in Metallurgy at Columbia University in 1939. He joined the Laboratories in 1930. Since then he has been engaged in metallurgical investigations of solders and lead base alloys.

Coin Collector and Directory Mounting

FOR the convenience of patrons at public telephone stations where booths cannot conveniently be installed, a shelf and mounting unit has been developed by the Laboratories. It is made entirely of wood, to avoid the use of strategic materials. Besides a coin collector, it supports a suspended directory and a broad shelf for writing and placing hand bags or parcels.

Shelf and mounting unit for public telephone stations in locations where the usual booths cannot be conveniently used

The coin collector is located at the center of the mounting board at an angle of 30 degrees with the wall. The directory is enclosed in a hard-covered binder which is suspended in a niche adjacent to the coin collector. Concealed behind the directory, the ringer is in a compartment which has an opening in front to allow emission of the sound. A wooden card frame is provided on the right side of the mounting for display and instruction cards.

This mounting unit is installed by attaching it with machine screws to nuts in a wooden backboard, which is fastened to the wall. Wiring the apparatus is facilitated by providing a channel in the rear of the backboard.

These coin collector mountings may be installed singly or in groups. When in groups the directory compartments provide partitions between adjacent stations.

Besides a coin collector, the mounting supports a suspended directory and a broad shelf for note taking and placing hand bags or small parcels